

Coal Age



Coal Progress and Problems



**Imagine a 150-man
maintenance crew!**

Ridiculous? Perhaps. But if a breakdown in your coal-hauling system can stop your entire operation...if you have to pay a full crew to stand by until coal will move again...you are adding the entire payroll of your mine to your maintenance costs!

That's the basic maintenance-cost difference between the "continuous" method and *constant* coal hauling with mine cars!

If a mine car breaks down, only one car is out...everything else goes on. Coal is being cut, loaded, hauled, dumped, processed, and shipped. Inexpensive repairs are made in your own shop. Your operations are not stopped and every man in the mine can keep getting coal out!

If you're planning a new coal hauling system, let your nearby **A.C.F.** Sales Representative show you what a *reliable, well planned* mine car system can do for you. American Car and Foundry Company, New York • Chicago • St. Louis • Cleveland • Washington • Philadelphia • San Francisco • Pittsburgh • Huntington, W. Va. • Berwick, Pa.

a.c.f. MINE CARS

for Greater Mining Efficiency



Photo courtesy Inland Empire Paper Co.

Rubber helps put the squeeze on paper

A typical example of B. F. Goodrich product improvement

GOING down that line is next month's newspaper; those big rolls are squeezing the last water out of pulp—the last roll will come dry, finished paper.

But the leather belt that had been used to drive those heavy rolls had to be so tight that it soon stretched and wore out. Then the whole mill would shut down while the belt was repaired or replaced. An ordinary rubber belt wouldn't do because the pull on the belt was so great the metal fasteners, used for joining the belt ends, would tear out.

But B. F. Goodrich had developed a belt so strong it rarely stretches and then invented a method of locking belt ends together with a splice which never tears loose. Where ends of the outside plies come together they are carried down under the surface, protected by a flexible top layer and vulcanized with new rubber. This splice actually ends 90% of all belt troubles.

A B. F. Goodrich rubber belt, made endless by this Plylock Splice, as it is called, was put on the big mill in the picture; it has already outlasted leather 3 to 1.

The Plylock Splice illustrates the B. F. Goodrich policy of constantly improving the value to the customer of everything made of rubber-for-industry. Research here never stops; nothing is ever "good enough"; improvement must be constant. Some people might call it improving ourselves out of business; we call it the American competitive profit system at work. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

B.F. Goodrich
RUBBER FOR INDUSTRY

The Champion

...IN MARKSMANSHIP



From The Bettmann Archive

Annie Oakley, of the "Police Gazette" rifle team, shooting 5,000 glass balls at Cincinnati, 1885.

Annie Oakley, born in a log cabin, of Pennsylvania parents, was a "dead shot" from the age of 9. At 14 her shooting paid off the farm mortgage with the wild game she sent to market ... and began to attract more than local attention. At 16 she beat Frank Butler, a famous professional marksman, in a rifle contest, and soon married him. Annie's skill was almost unbelievable! At 90 feet she could split a playing card's thin edge; hit dimes; put half a dozen holes in a card, flung in the air, before it touched ground. In one day, with a .22, she broke 4,772 out of 5,000 small glass balls. Queen Victoria was charmed by her; and she shot a cigarette from the mouth of the German Crown Prince. Annie made sensational shooting records almost to the end of her life, in 1926.

HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

The Champion

...IN COAL MINE LUBRICATION



Hulburt *Quality*
"The Champion" GREASE

Speaking of shooting — HULBURT QUALITY GREASE is the recognized Champion Trouble-Shooter when it comes to Coal Mine Lubrication. Right from the beginning it paid off, attracted wider and wider attention among coal mine operators. Like Annie, HULBURT always did (and still does) one thing supremely well — i.e., makes a bull's-eye in making a Grease of unbeatable Quality — compounded for one sole purpose, the proper lubrication of coal mining machinery. Let a trouble-shooting HULBURT Lubrication Engineer go down into your mine — he'll help you make new records for economical machinery operation.



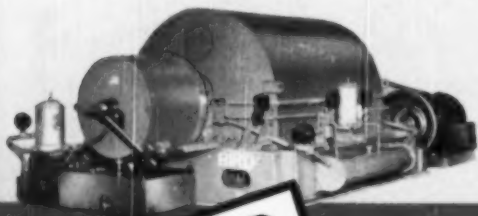
No need to duck this one any longer

If you're one of those who has hesitated to tackle fine coal preparation because drying looked like too much of a headache, you need hesitate no longer.

The BIRD COAL FILTER takes the fine coal from any washing process. It does the com-

plete job without additional screens or other auxiliary equipment. It runs continuously for long periods without shutdowns for maintenance.

Get the whole story on the BIRD and how it fits into your layout. Ask us to mail you a copy of the Bird Coal Filter Bulletin.



BIRD MACHINE COMPANY
SOUTH WALPOLE • MASSACHUSETTS

The BIRD

**Continuous Centrifugal
COAL FILTER**

Coal Age

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CONTENTS • FEBRUARY • 1950

Number 2

Editorial: Dead End—or New Start?	69
Coal: Review and Outlook	
1949—Troubled Year	70
Coal Expands Machine Use	76
Loader and Cleaner Sales—W. H. YOUNG and R. L. ANDERSON	81
Safety in 1949—FORREST T. MOYER	84
Efficiency and Flexibility Mark Jonay Preparation	86
Core Drilling for Air—DAVID ZEGER	92
Controlling Belt Conveyors—W. F. ROBERTS	97
Better Stripping With Radio	102
Air for Anthracite	106
Grease Truck Cuts Maintenance and Lubricant Requirements	114
Causes of Electrical-Equipment Failures	116
Corn Cobs Dry Clean Electrical Apparatus	118
Alloy-Steel Bits and Sharpener Serve Sewickley-Seam Mines	120
Minimizing Battery-Connector Corrosion	120
Foremen's Forum	110
Equipment News	122
Equipment Publications	138
Among the Manufacturers	141
News Round-Up	147
Coal Men on the Job	152

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Lower
upkeep costs

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Lower upkeep costs are assured, too. *Texaco Olympian Grease* resists oxidation and separation . . . *stays in* the bearings . . . seals out dirt and moisture. This means bearings get greater protection . . . repairs and replacements are greatly reduced. *Texaco Olympian Grease* is made in three consistencies to meet every need.

Use it in plain, cavity hub and anti-friction bearings.

In your hydraulic mechanisms, use *Texaco Regal Oils (R & O)*. These turbine-grade oils inhibit rust, sludge and foam . . . keep operation smooth and trouble-free . . . reduce maintenance costs.

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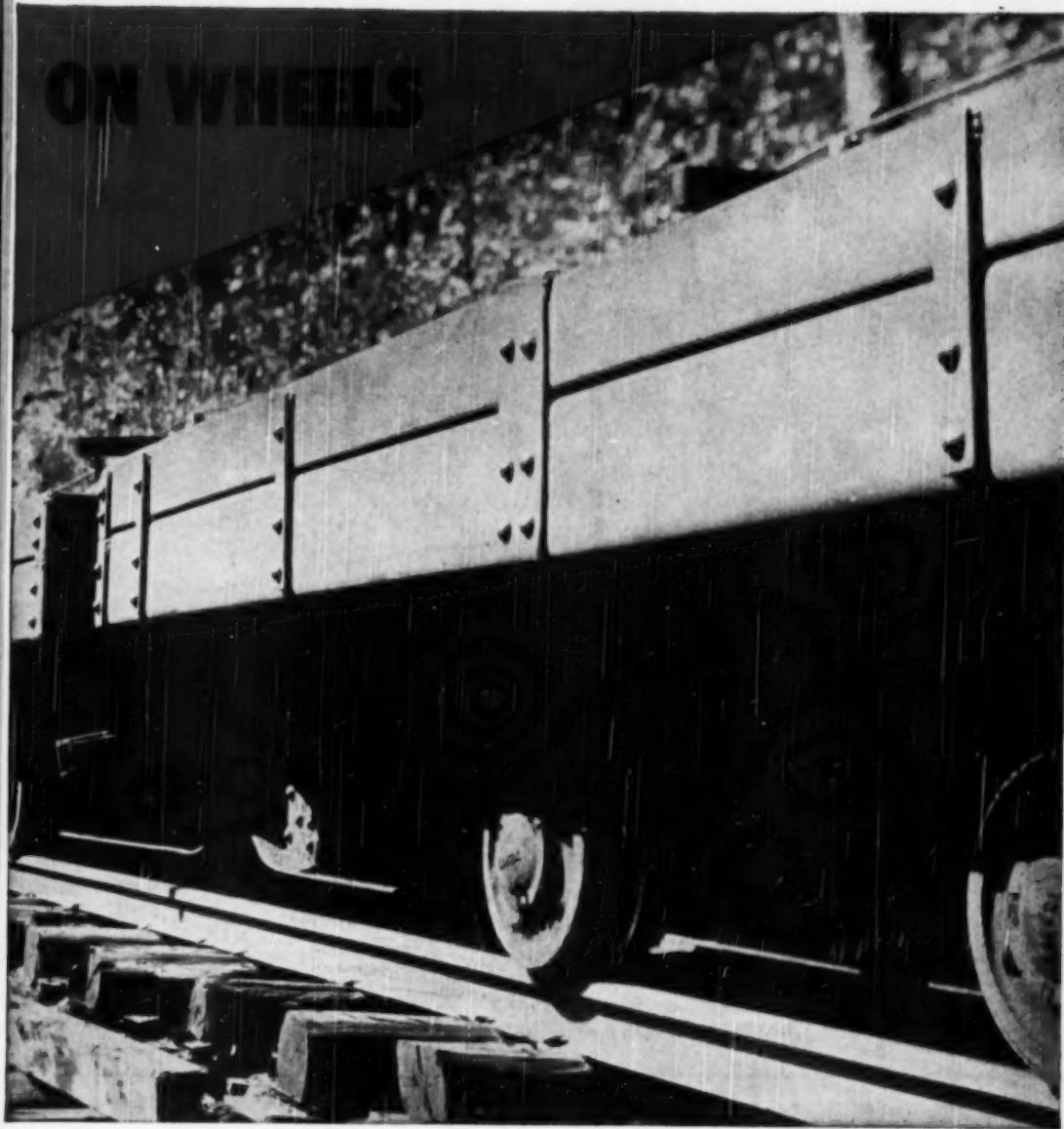


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ON WHEELS



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ing, spraying or pouring. Long lasting.

Use *Texaco Crater A* to protect wire rope from rust, wear and breakage. It penetrates the strands and preserves the core . . . stays soft . . . keeps rope strong longer.

For the Coal Mining Industry

Big Bruisers



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When buying, look under the hide to see what you're getting. Foresight is cheaper than hindsight.



INDIVIDUAL FUEL INJECTION PUMPS for each cylinder - meter the fuel, time the injection, and provide accurate injection pressure. Pumps operate at half engine speed - an important factor in their long life.



NON-CLOGGING, SINGLE-ORIFICE FUEL INJECTION VALVES give clean, efficient combustion throughout the entire operating range of the engine - low idle, part load or full load. They are non-adjustable and interchangeable.



METAL-EDGE TYPE OIL FILTERS consist of four nested parts which provide a large filtering area. The full oil flow passes through these filters continuously, allowing no chance for harmful particles to be circulated by the oil stream.



ABSORBENT TYPE FUEL FILTERS consist of a filter paper covered core wound with cotton yarn in a closely controlled pattern so that the entire depth catches and holds even the finest abrasive particles. The low-cost filter elements safeguard the fuel injection parts.



CONVENIENT FUEL PRIMING PUMPS and air bleed valves enable the fuel system to be bled with very little effort. A glass window makes it easy to tell when all air has been removed.



AIR STARTING consists of a vane type air motor which cranks the Diesel through a Bendix type drive engaging the flywheel ring gear. The motor, air pressure regulator, oiler, and control valve may be mounted on either side of the engine.



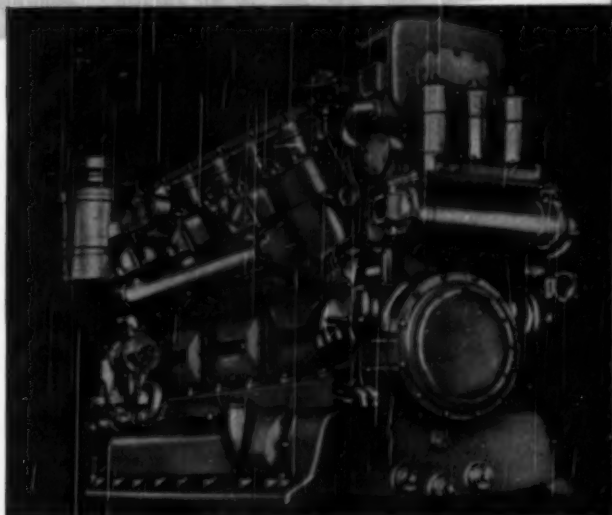
ELECTRIC STARTING consists of two 32-volt motors mounted on each side of the engine. As in the case of air starting, the Diesel is cranked through a Bendix type drive.

NEED Big Muscles

LOADING, lifting and swinging a full 7-yard load from the end of a 120-foot boom is no "pantie-waist" exhibition. For handling such big bites, the Ruby Construction Company, Inc., repowered their giant Bucyrus-Monighan dragline with the big new 400-horsepower "Caterpillar" D386 Engine. Because of the power and lugging ability of the "Cat" Diesel, bucket size was increased from the original 5-yard capacity. With its more "muscular" "Cat" Diesel, the outfit has moved more earth at a faster rate than it has ever done before.

The D386 and the still more powerful D397 (500 hp.) have extended the line of "Caterpillar" Diesels to meet a much wider range of power requirements. Built in "Caterpillar's" huge new engine factory, "Caterpillar" Diesels offer you many exclusive, profit-making features. By specifying "Cat" Diesels on your equipment orders, you are assured maximum economy, utmost dependability, and lowest maintenance costs.

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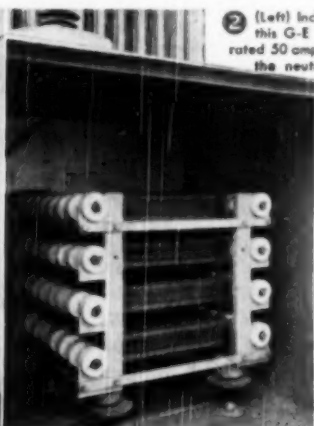
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"We're sold on it!"

"THAT'S WHY WE'RE
INSTALLING THE SAME
SETUP IN ANOTHER STRIP MINE."

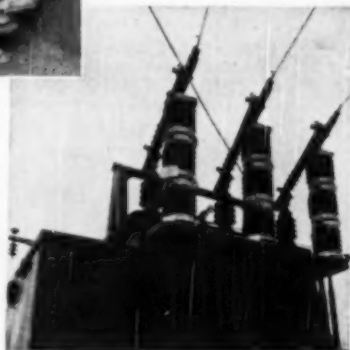


① (Left) Here is the Marmaton Mine's G-E outdoor-type, skid-mounted unit substation, rated 1500 kva, which steps down incoming power from 33,000 to 4160 volts. Because the G-E power distribution system keeps the voltage drop to a minimum, the equipment can operate farther from the substation, thus resulting in less frequent moving of the substation.



② (Left) Included in the unit substation is this G-E Type EW grounding resistor, rated 50 amperes continuous, for grounding the neutral of a 4160-volt circuit. It eliminates the hazard of high-voltage shocks resulting from undetected shorts.

③ (Below) Installed on the 33 kv incoming line of the unit substation, these 3 sets of G-E Thyrite station-type lightning arresters are each rated 34.5 kv. Compact and of simple design, these G-E arresters have a record of excellent protective efficiency in preventing system disturbances or outages.



GENERAL  ELECTRIC

Complete General Electric power distribution system helps minimize shutdowns, reduces delays and accidents, cuts costs, says Mr.

L. E. Briscoe, Electrical Engineer of Fairview Collieries.

At the new coal-stripping operation of the Fairview Collieries Corporation at the Harmattan Mine near Danville, Illinois, a complete, co-ordinated General Electric power distribution system was recently installed, comprising unit substation, cable, and cable-skid switch houses. As a result, according to Mr. L. E. Briscoe, electrical engineer in charge, "We are sold on this type of power distribution system and are installing the same setup in another strip mine that we are modernizing."

Let Mr. Briscoe explain why:

"A dependable power distribution system," he says, "helps keep shutdowns to a minimum, which is the key to successful dragline operation. By using cables instead of overhead lines, power lines can be kept out of the way and advance with the operating equipment. This eliminates many accidents and delays, and provides big savings in money."

"The flexibility of our G-E system is due to (1) use of standardized equipment, (2) use of polarized couplers which permits interchanging cables, and (3) the ease and speed with which the cables can be interchanged."

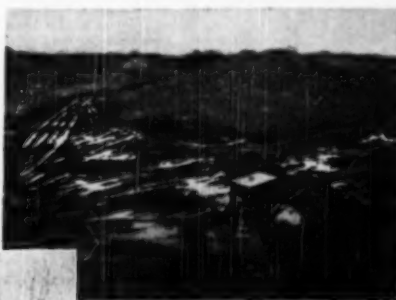
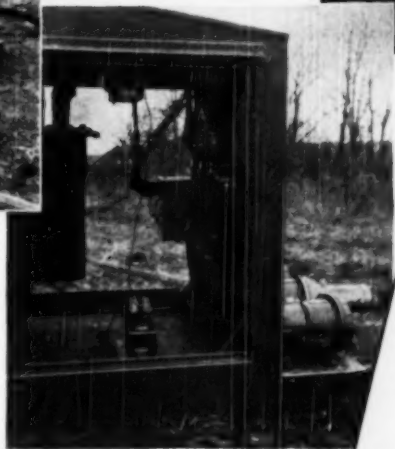
"The G-E power distribution system also provides for testing ground continuity of each 4160-volt incoming and outgoing cable on the hill-type cable skids. This assures that the ground protection system is always working, does away with testing the cables by bells or other methods, and saves us valuable time."

Advantages such as these—plus additional savings in power costs and relocating time and costs—can be yours with a completely integrated G-E power distribution "package." It's worth your while to check the facts with a G-E mining specialist. Call him—today. Apparatus Dept., General Electric Co., Schenectady 5, N. Y.



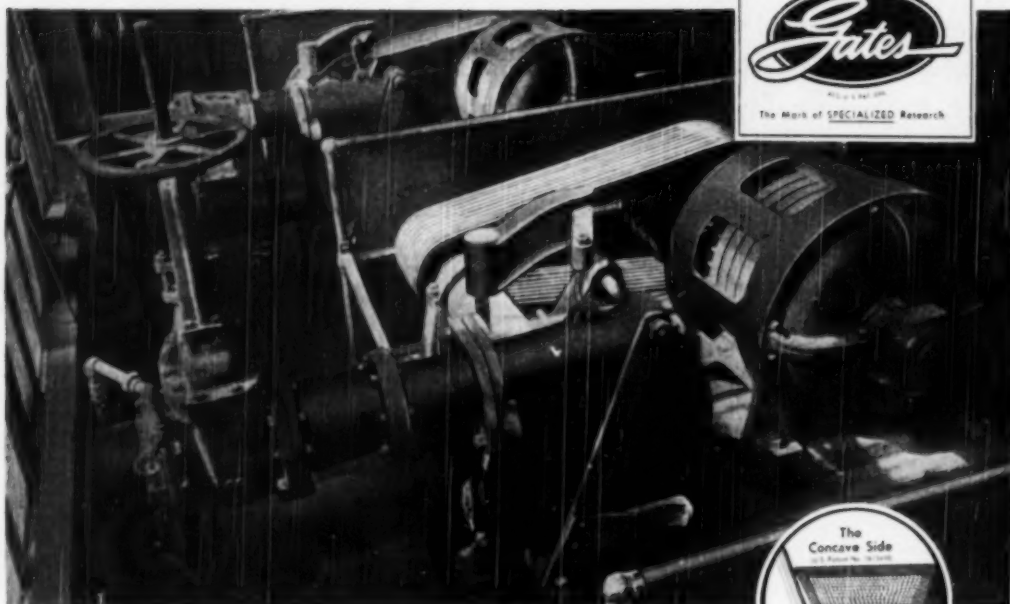
4 (Above) The Harmattan Mine uses 9 of these G-E portable, cable-skid switch houses to serve its surface mining equipment. They provide maximum portability and convenience plus more selective tripping. For safety, the G-E system is designed to have at least two protective breakers between each piece of operating equipment and the unit substation.

5 (Below) This interior view of one of Harmattan's hill-type cable-skid switch houses shows the power circuit breakers, rated 25,000 kva interrupting capacity, 3 phase, 60 cycle, 5 kv maximum; together with a 6-volt battery and a G-E Type 58-1 switch for testing ground continuity.



6 (Above) G-E cable-skid switch houses are metal-enclosed and sturdily built to provide maximum service continuity under conditions such as shown here. At Harmattan, G-E portable cable—all of the same type for easy interchangeability—is used exclusively.





These big sand pumps handle thickened slimes at the outlet of Miami Copper's 8,000,000 gallon thickener. Operators like the Gates Vulco Rope Drives because if anything happens to a pump and the drives get wet these V-Belts, which run in grooved sheaves, do not slip off. Also, a simple change in sheave size easily provides a considerable change in pump speeds.



Two Distinct Savings in V-Belt Costs Are Yours with Gates Vulco Ropes

A simple test that takes less than two minutes will save you many dollars in V-Belt costs. Here it is—

Have someone bend a V-Belt exactly as it bends in going around its pulley. As it bends, grip its sides with your fingers. You will feel those sides *change shape*. In a straight-sided V-Belt, the sides become *convex* as the belt bends. And note how the sides *bulge out*. (Figures 1 and 1A)

Now try the same test with a V-Belt that is built with the concave side. You will feel a change in shape—but a *different result*! The sides do not become *convex*. Instead, they become perfectly *straight*. The bent belt now has a shape that exactly fits its sheave groove—as shown in Figures 2 and 2A.

Two distinct savings result. *First*—There is no side-bulge to cause uneven wear. The sides press *evenly* against the V pulley and therefore wear *uniformly*—resulting in *longer life*! *Second*—The *full width* of the sidewall grips the pulley—thus carrying heavier loads without slippage—and this *saves belts* and also *saves power*!

When you buy V-Belts, be sure you get the V-Belt with the Concave Sides...the Gates Vulco Rope!

What Happens When a V-Belt Bends

Straight-Sided V-Belt



How Straight-Sided V-Belt Bulges in Sheave-Groove.

Gates Vulco Rope with Concave Side.

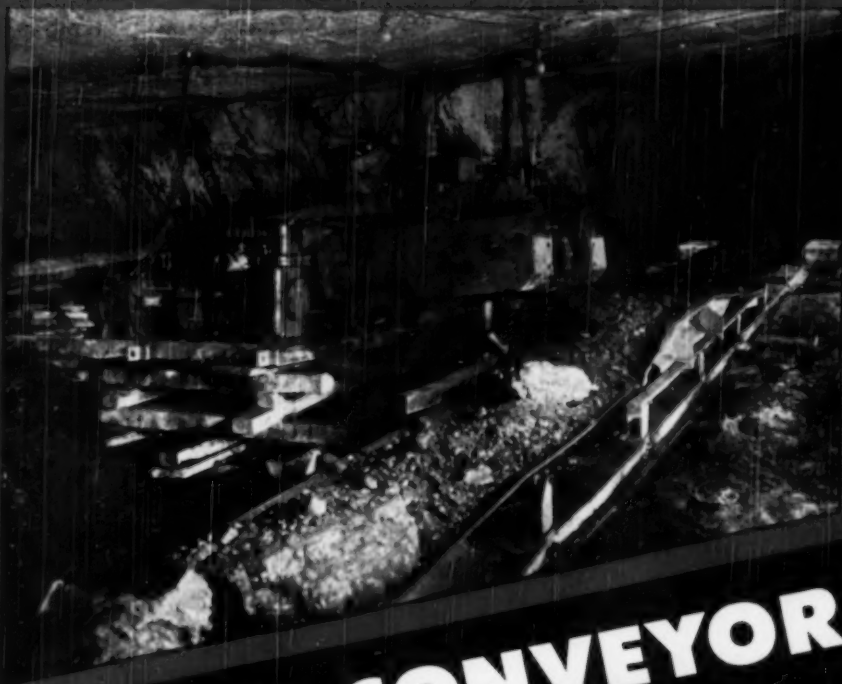


No Side Bulge. Precise Fit in Sheave Grooves.

THE GATES RUBBER COMPANY
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The World's Largest Makers of V Belts

GATES VULCO ROPE DRIVES
Engineering Offices and Rubber Stocks
IN ALL INDUSTRIAL CENTERS at the U. S. and 71 Foreign Countries



JEFFREY CONVEYORS

speed coal on its way at low cost

Jeffrey Chain and Belt type Conveyors are applicable to both Bituminous and

Anthracite mining. Their design and construction are the result of long experience in designing and building mine equipment. Each type of conveyor has been thoroughly proved in service under all kinds of operating conditions.

Jeffrey Conveyors incorporate every feature essential to successful low cost operation:

- | | |
|---|---|
| Rugged construction | Dependable power |
| Durable materials | Economical operation and maintenance |
| Light weight design | Safety to equipment and workman |
| Simplified method of coupling sections | |

Note the accompanying installation showing a Jeffrey Chain Room Conveyor discharging into a main entry Belt Conveyor. Efficient and dependable for 'day in' and 'day out' service.

Consult a Jeffrey Engineer for specific information on the application of Underground Conveyors to your operation.



90-49

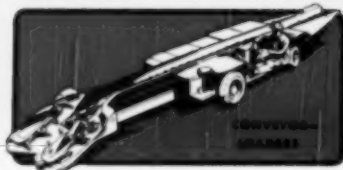
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● Large illustration shows a Jeffrey Chain Entry Conveyor carrying coal to main haulage . . . Smaller view shows a Jeffrey Main Haulage Belt Conveyor speeding coal to the tippel.





DOUBLE HEADER
LOADERS



CONVEYER
LOADERS



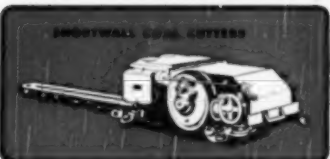
TRUCK AND STORAGE
BATTERY RECHARGER



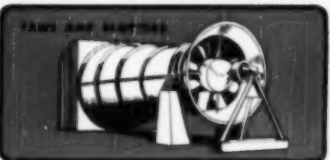
14-000 PILLING MACHINE



70-00 UNIVERSAL LIFTER



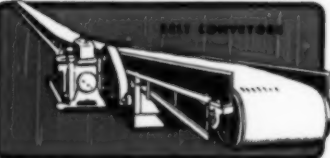
100-TON COAL LIFTER



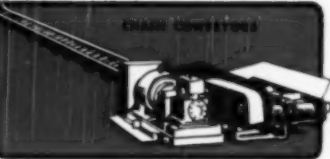
70-00 AIR SEPARATOR



100-TON STEEL SHUTTLE CAR



100-TON CONVEYOR



CHAIN CONVEYOR



100-TON VEHICLE

JEFFREY

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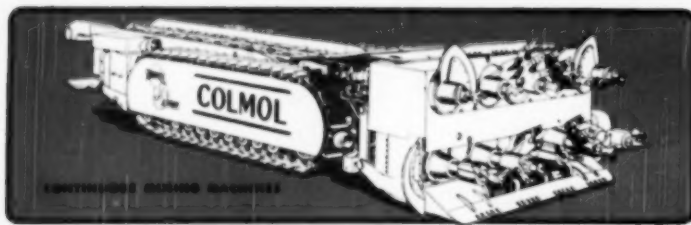
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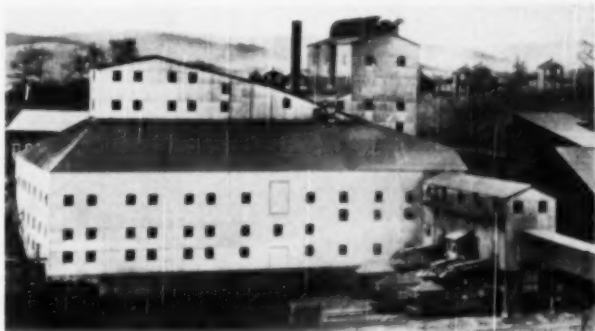
... with Complete Coal Preparation
Plants, All the Way from Design to
Erection ... or ... with many of
the products that enter into
the operation of Coal
Preparation Plants.



The Heyl & Patterson Rotary Car Dumper at Ceredo (one of the many H & P Products) is completely automatic. A spring cushioned thrustor-operated automatic centering device properly registers the Dump in receiving position upon completion of the dumping cycle. The Dumper makes a complete dump cycle of start, slowdown

and final stop in correct receiving position without any attention on the part of the operator other than depressing the starting button.

The new Coal Preparation Plant at Lucerne, built by Heyl & Patterson, is an example of the H & P Method of coordinating engineering, fabrication and erection of modern coal preparation plants, using H & P Products along with other nationally accepted products.



**MAY WE TALK TO YOU ABOUT
YOUR FUTURE COAL PREPARATION PLANS?**

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Railroad Car Dumpers
High Lift-Turnover-Rotary
Coal Preparation Plants
Coal & Coke Handling Equipment
Roof Loaders and Unloaders
Rotary Mine Car Dumpers
Coal Crushers
Coal Storage Bridges
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CONSUMED



A modern "Chance" washer producing a high quality and uniform product with a maximum recovery for Clinchfield Coal Corporation.

Chance original "heavy density" coal cleaner.

FAIRMONT MACHINERY

Designers and Constructors of Chance Sand Flotation Process

Power Utilities

95,686,000 TONS OF BITUMINOUS COAL IN 1948

ELECTRIC UTILITIES REPRESENT *Bituminous Coal's* **LARGEST SINGLE MARKET**

• The 1948 consumption of practically 96 million tons of bituminous coal by the nation's electric utilities comprised 18 per cent of the national output. The electric utilities spent 775 million dollars for fuel in 1948 with bituminous coal representing a major portion. Solid fuels are to be used in at least two-thirds of the new thermal generating capacity now getting under way.

THE TREND IS TOWARD BETTER PREPARED COAL. This is disclosed in the following statistics covering bituminous production. In 1936 about 26 per cent of the United States bituminous production came from mines having cleaning plants—and with the demand for cleaner coal constantly in-

creasing, this proportion has grown to 37 per cent in 1947.

Your chances of capturing a reasonable slice of this highly desirable market will be definitely improved if you can deliver a scientifically prepared coal—in short FAIRMONT Prepared COAL.

In addition Fairmont offers you a selection of the method best suited to your coal—the Chance Sand Flotation Process for Wet Cleaning and American Pneumatic Separator for Dry Cleaning.

Fairmont designs and builds complete preparation systems and has available experienced engineers to assist you in selecting the method best suited to your needs. Consult Fairmont on your coal preparation requirements.

COMPANY • FAIRMONT, W. VA.

for Wet Cleaning and American Pneumatic Separator for Dry Cleaning

Here's a
typical

TOURNADOZER

**8:00
A.M.**

Tournadozer
cleans up
around shovel
in the ore pit . .

At Biwabik, Minnesota, Stanley Mining Company operates an ore pit, crusher, and washing plant 24 hours a day, 7 days a week. They are mining heavy rock, mixed with banded taconite, which must be crushed, screened, then processed to recover iron ore. On this multi-handling operation, they have a lot of widely-scattered dozer jobs . . . and have found the answer in a LeTourneau high-speed, rubber-tired Tournadozer. Above photos show how its fast, "run-about" ability helps Stanley Mining Company maintain steady, balanced production of pit and plants.

Tournadozer's principal job is handling clean-up around the ore shovel. It utilizes normal waiting periods to maintain the rock dump . . . cleans

spillage at the crushing plant . . . feeds material from surge pile to hopper. Tournadozer gets there, gets each job done, and gets back to shovel FAST. It's also readily available at a moment's notice to clean second-growth timber ahead of a self-propelled rock drill . . . "lends a hand" whenever the crusher plant crew makes screen adjustments . . . builds and maintains haul roads.

With Tournadozer's faster-than-crawler speeds, in both forward and reverse, you, too, can get more work done, at lower cost per job. Let your LeTourneau Distributor show you how one Tournadozer can do the work of 2 to 3 conventional crawler dozers on your jobs. Write, or call TODAY.

LETOURNEAU



To: R. G. LeTOURNEAU, INC., Peoria, Illinois

Send us more Tournadozer information:

☐ specifications ☐ job performance reports ☐ would like job analysis on our work

NAME..... TITLE.....

COMPANY..... TYPE BUSINESS.....

STREET..... CITY..... STATE.....

Type of work to be handled:.....

Also interested in ☐ 25 m.p.h., 7-yd. D Tournapoll ☐ 30 m.p.h., 13-yd. C Tournapoll ☐ ram-dump Tournashoppers ☐ bottom-dump Tournashoppers

8-HOUR SHIFT *at Stanley Mining Co.*



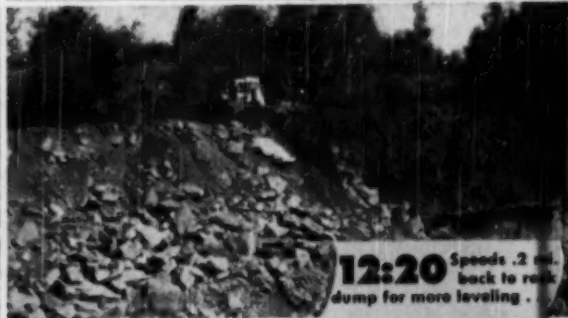
8:48 Travels .4 mi. to the crusher, cleans up drain spillage



11:55 Feeds material from surge pile to hopper at crushing plant



9:25 Runs .2 mi., and levels taconite-rock dump . . .



12:20 Speeds .2 mi. back to rock dump for more leveling . . .



9:34 Returns .6 mi. to pit for more clean-up at the shovel



12:25 Drives .6 mi. to pit, cleans up again around shovel . . .



11:45 Drives .4 mi. to help crew adjust screen at crusher



3:45 Goes .4 mi. to surge pile, P.M. feeds hopper. Next shift, 4:00 to 12:00.

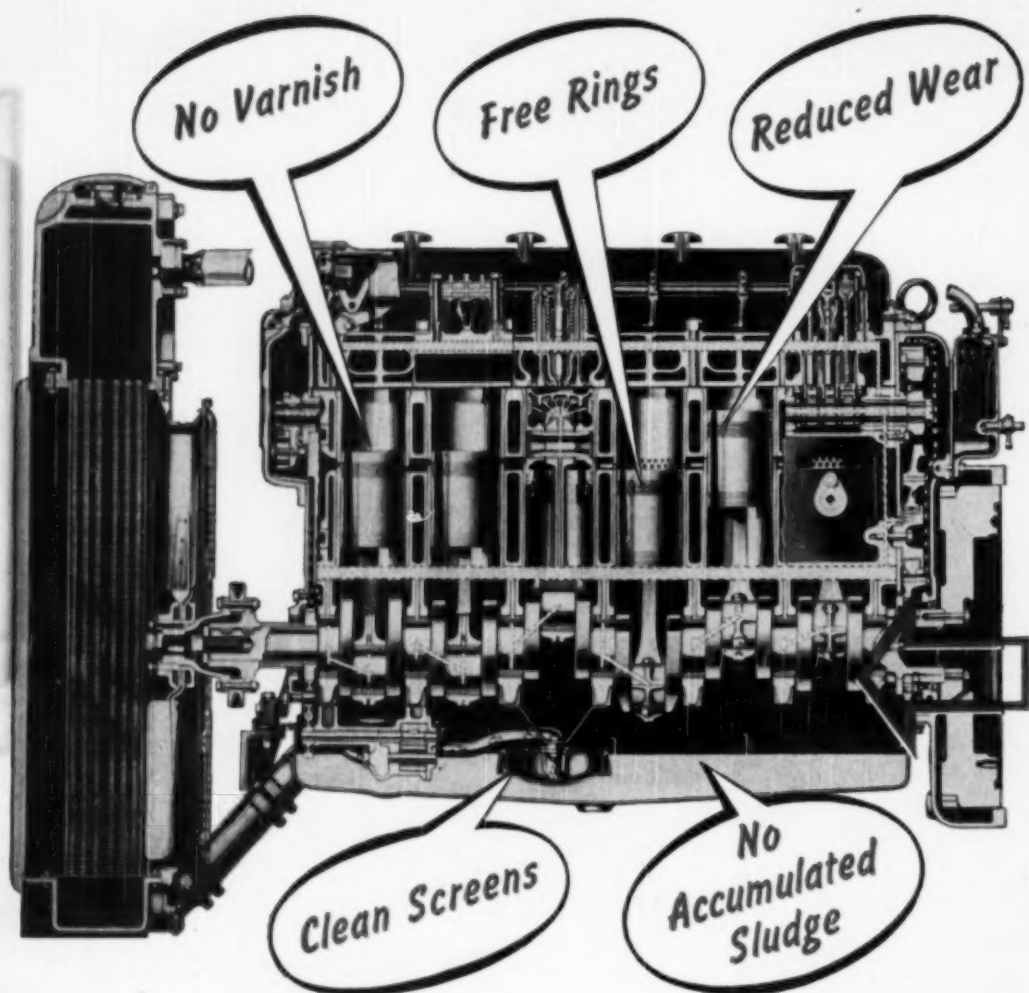
LETOURNEAU
MADE IN U.S.A.



TOURNADOZERS

IT'S RUBBER THAT PUTS THE ACTION IN TRACTION

In SEVERE DUTY.. Can Double Engine



SINCLAIR HEAVY

Your Nearest Supplier of Sinclair Products Will Gladly Arrange for Lubrication

. New ***SUPER TENOL*** Life Between Overhauls

New Sinclair **SUPER TENOL** is an oil specially developed to eliminate the high maintenance costs so frequently encountered in both types of "severe duty" service: — 1. High temperature, high speed, over-load; and 2. Low temperature, light load, long idle, stop-and-go.

Under these abnormal conditions, operators

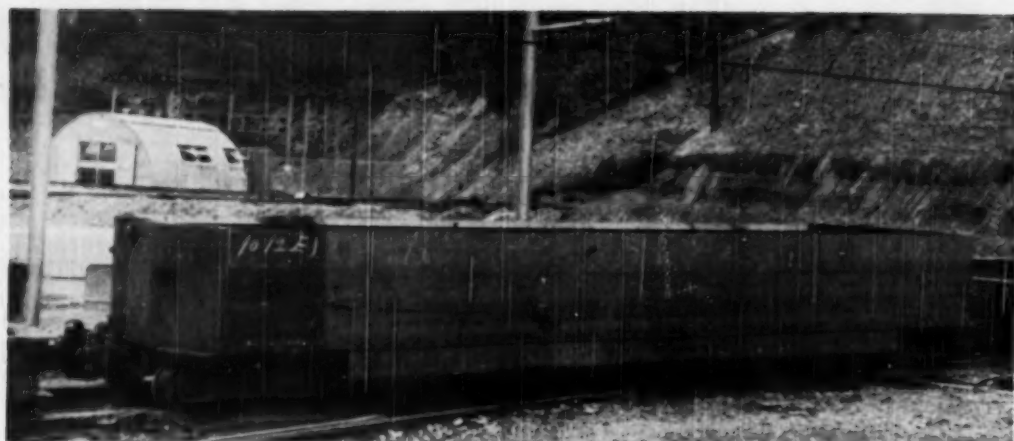
report new **SUPER TENOL** has more than **DOUBLED** the life of their equipment between overhauls.

If you operate diesel-powered or gasoline equipment in severe duty service it will pay you to change to new **SUPER TENOL** now—to keep equipment in operation many more days each year, to save time, labor and money.

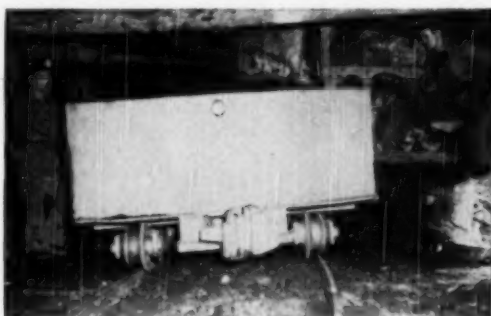
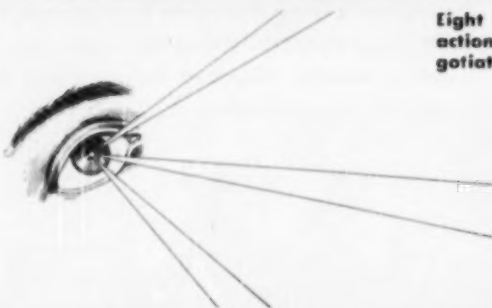


DUTY LUBRICANTS

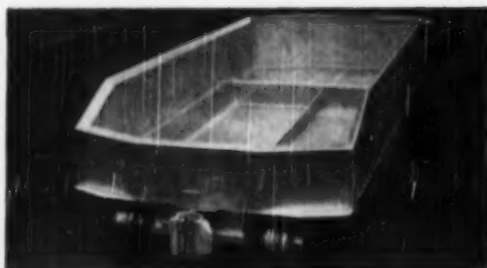
Counsel or Write to Sinclair Refining Company, 630 Fifth Avenue, New York 20, N. Y.



Eight wheel AXLESS Trucks with long gentle spring action produce the utmost in roadability and negotiate uneven tracks easily.



Differential cars yield maximum capacity within given dimensions. Sturdily constructed for long life, low maintenance.



A smooth, clean interior. Minimizes coal sticking in the car.

**NO MATTER
WHICH WAY YOU LOOK AT IT**

DIFFERENTIAL MINE CARS

**ADD UP TO "TOPS" IN
DESIGN, WORKMANSHIP, AND PERFORMANCE**

DIFFERENTIAL STEEL CAR COMPANY

FINDLAY, OHIO, U. S. A.

Builders of Haulage Equipment Since 1915

AIR DUMP CARS

MINE CARS

MINE LOCOMOTIVES

ROCK LARRIES

DUMPING DEVICES

BURDEN-BEARING LOCOMOTIVES

STOCKPILING CARS

COMPLETE HAULAGE SYSTEMS

One man can drill
50% MORE HOLES
in less time and with
far less effort—with

the **NEW**
JOY
RUBBER TIRE-MOUNTED
ROOF-BOLTING DRILL

- ★ Highly Mobile
- ★ Greater Flexibility
- ★ Greater Stability

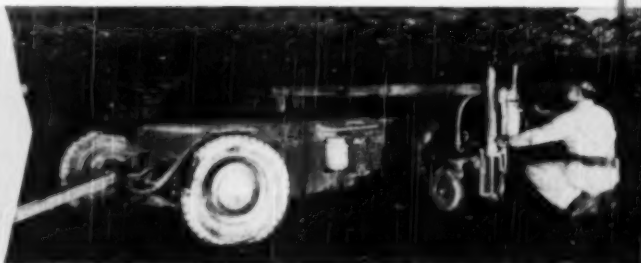


JOY Roof-Bolting Drills and Mine-Air Compressors—available in a complete range of types and sizes to meet any requirement—are backed by more than 50 years of drill and compressor-building experience.

The other half of your Roof-Bolting Team

JOY MINE-AIR
COMPRESSORS

Compact • Mobile • Highly Efficient



Write for Bulletins, or

Consult a Joy Engineer



ARD CL 2064

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

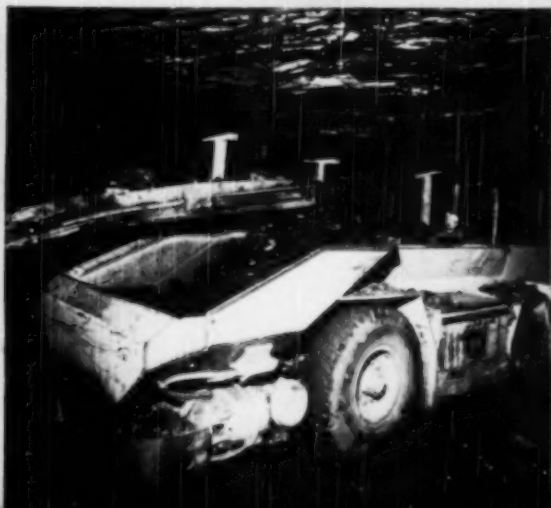
JOY

EQUIPMENT

Designed and Field-Proved

The JOY 11-BU LOADER is a heavy-duty machine, capable of loading both coal and rock out at rates up to 10 tons per minute in seams 60" or more in height.

The JOY 60-D SHUTTLE CAR, battery-powered for high maneuverability, handles a 10-ton load of either coal or rock. Also built with hydraulic cable reel, as the 60-E.





The JOY 10-RU UNIVERSAL CUTTER can make shear cuts anywhere in the face, as well as horizontal cuts anywhere from the top down to 3½" below bottom.

The 10-RU is highly maneuverable, and completely hydraulically controlled. Dual controls are centrally located on each side of the machine for safe, easy operation.

for high-production FULL SEAM MINING!

Here's why JOY Cutters, Loaders and Shuttle Cars give you greatest tonnage output in split seams

- ★ JOY Machines bring you *double* advantage: they combine the merits of full seam mining with those of trackless mining, for greatest production per shift.
- ★ The JOY 10-RU Universal Cutter is a fast-tramming, powerful machine which gives you the *faster* cutting required in trackless mining.
- ★ The 10-RU makes both the shear and horizontal cuts that full seam mining requires, to assure sufficient shattering of the parting for maximum loadability.
- ★ JOY Loaders and Shuttle Cars stay right behind the Cutter—assuring the greatest possible tonnage loaded out, at the least cost per ton.

Write for Bulletins, or

*Consult a
Joy
Engineer*



JOY MANUFACTURING COMPANY

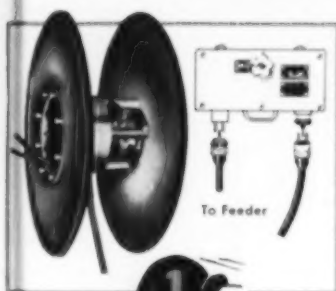
GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

JOY

can **KNOCK-OUT**

YOUR TRAILING CABLE REPAIR DIFFICULTIES



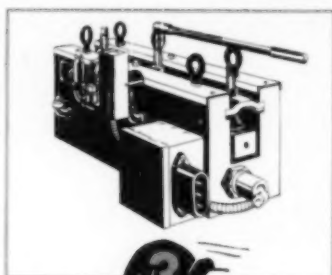
1
SECTIONALIZE WITH
PORTABLE CONNECTORS

The *first* step in JOY's proved 3-step plan is to eliminate *temporary* cable repair. On-the-job repairs lose too much valuable machine time, and are safety hazards at best. With "Mines" at-the-reel Connector Assemblies, you can sectionalize cable in easily handled lengths all the way from power source to machine. Damaged lengths can then be easily and quickly replaced with perfect spares—and all trouble-shooting, splicing and rejacketing operations centralized *in the shop*, for best work at the least cost.



2
USE THE CABLE
FAULT-FINDER

The *second* step is to provide for quick and accurate location of trouble without further damage to the cable, with the new "Mines" Cable Fault-Finder. This revolutionary unit is a light, compact, self-contained, battery-operated detector. Operation is similar to the wartime mine-detector—can be handled by anyone, with no special training required. Not usable on shielded cable, but immediately locates solid shorts, high-resistant shorts of 5000 ohms or less, and open circuits in rubber or neoprene-jacketed cable.



3
VULCANIZE ALL
CABLE REPAIRS

Third and final step in the JOY plan: install shop equipment for immediate, professional-type repairs to insulation and jacketing that will make damaged cable good as new. This job calls for *hot vulcanization*, not dangerous cold-taped splices. "Mines" Vulcanizers are available in five sizes, with mold designs and the necessary materials to cover all standard mining cable requirements. No special skill is needed to make perfect, watertight repairs, equalling the original cable's safety, wear-resistance and performance.

Consult a Joy Engineer for complete details and prices

WBD ME2953

MINES EQUIPMENT **MINES** Division

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.



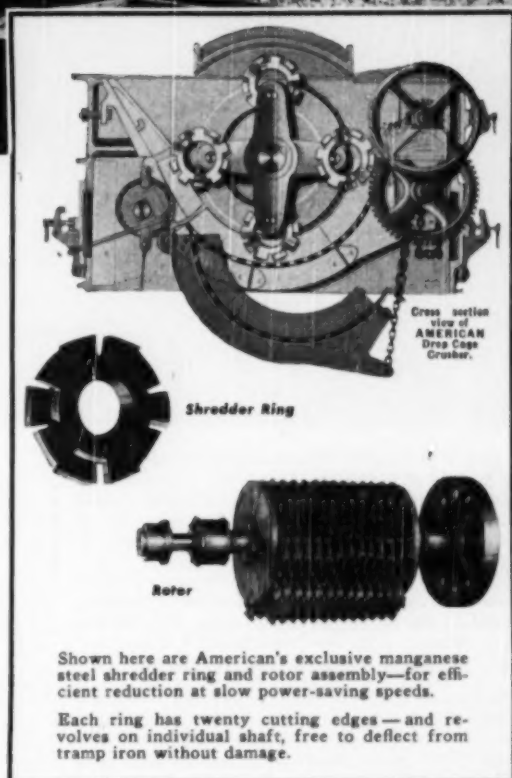
**AMERICAN CRUSHERS are
Engineered with Your Markets in Mind**

AMERICANS

***split* coal for uniform sizing
—with exclusive SHREDDER
RING action**

The profit is in the preparation, but improper ratios of unwanted fines and unbalanced screen rejects cut down your *marketable* tonnage—and your profits.

American Rolling Ring Crushers prevent such waste because they reduce coal by cleavage—not by blunt shattering force. The result is a controlled ratio of fines and no oversize—a high tonnage output of *uniform* sizes to meet exacting market demands.



Write for "AC Coal Crushing Bulletin"

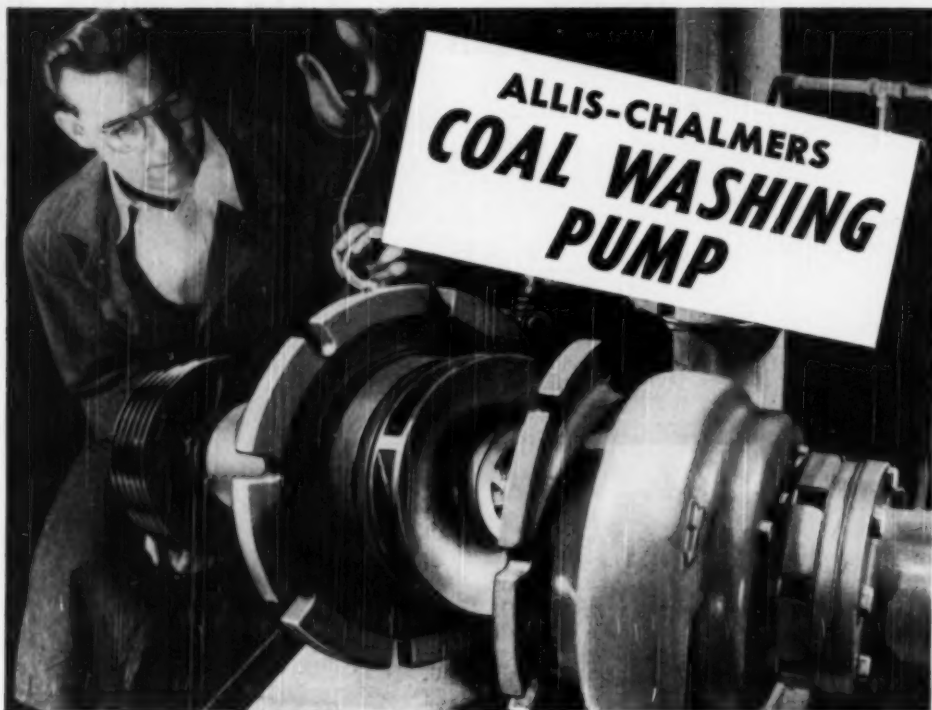
American

PULVERIZER COMPANY

*Originators and Manufacturers of
Ring Crushers and Pulverizers*

1119 MACKLIND AVE.
ST. LOUIS 10, MO.

Only 1/2 Hour to Service!



ALL COAL WASHING PUMPS require periodic replacement of worn parts. This "CW" (coal washing) pump saves you money because parts replacement is easy, fast and economical. The entire pump can be dismantled and reassembled in a half hour without disturbing piping.

Parts with varying rates of wear are separated. Only worn parts need be replaced. Three sets of bearings, brackets and shafts cover entire range of pump sizes . . . reducing parts inventories as much as 2/3!

USERS REPORT LONG WEAR

Experiences of coal operators prove that the combination of *Allisite*, an abrasion-resistant alloy, heavier construction and expert application engineering give the "CW" pump longer wear between servings. Users say:

"Inspection and lubrication have been only expenses on our A-C coal washing pump in 10 months of operation."

"After 13 months operation, two and three shifts, we have just replaced impeller on A-C coal washing pump."

Allisite is an Allis-Chalmers trademark.

"A-C coal washing pump still delivers full flow after pumping slurry with 50% solids for 8 months." An A-C representative will be glad to give you additional facts and figures on possible savings for you. Or write for Bulletin 6381.

A-2765

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.



ONLY FIVE WEARING PARTS

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.



ALLIS-CHALMERS

Rome 60 MINING CABLES



APPRO. NO. F-105 BW
meets full compliance
with Federal and Penn.
Safety Codes



First BY CHOICE!

Take a good look at this Rome 60 Flat-Twin (Parallel Duplex) Mining Machine Cable. See how the grounding conductor is separated from the insulated conductors by a Neoprene web . . . in fact, it is embedded solidly in molded Neoprene, same all-resistant material as the long-wearing sheath.

Check these definite advantages:

Maximum Flexibility . . . greater elasticity due to the complete absence of restraining fibrous "separators."

Non-Rotting . . . as compared with fibrous components, the Neoprene web will not rot or deteriorate. **Increased Protection Against "Shorts"** . . . high quality rubber compound, combined with Neoprene for unbeatable insulation.

Higher Impact Resistance . . . because of the shock absorbing resiliency of Neoprene compared with harder fibrous materials.

Add to these: Rome's long aging, moisture and heat-resistant rubber insulation permitting continuous operation at temperatures up to 75° C, thereby, providing higher rated current carrying capacities and greater over-load protection.

A tough Neoprene sheath vulcanized in continuous lead molds for maximum durability, plus resistance to oils, acids, abrasion and flame . . . Yes, in Rome 60 you have a mine cable that's hard to beat. Specify it on your next mine cable purchase.

It Costs Less to Buy the Best...

Buy Rome Cable

- ★ Maximum flexibility
- ★ Adequate grounding
- ★ Flame resistance

Standardize on these Rome Mining Cables:

Rome 60 Type SO Portable Cords	Rome 60 Portable Power Cables
Rome 60 Locomotive Cable	Type W--Up to 3000 Volts
Rome 60 Concentric Mining Cable	Rome 60 Portable Power Cables
Rome 60 Flat-Twin (Parallel Duplex) Mining Cable—Types W and G	Type G—Up to 5000 Volts
	Mine Power Distribution Cable
	Shot Firing Cord
	Mine Telephone Wire





LESS BARK...
MORE BITE!

The **ROCKMASTER "16"** Blasting System Means Less Noise and Vibration . . . Better Breakage!

That's good news for blasters in quarries, pits, construction jobs, underground workings. On the surface, less noise and vibration means greater freedom from complaints by neighbors. Underground, it means greater *safety*—less danger of damaged or shaken timbers.

Operators are getting far better control of breakage, too—even with wider spacing of drill holes. There is less need for secondary blasting, and blasted rock is handled and milled more economically.

There's more good news of blasters in the ROCKMASTER "16" story! Sixteen periods—a wide choice of short or long milli-second delays—give better control over throw, backbreak, and material size. Sixteen delay periods fire in just slightly over a half-second—there is less dust and a quicker return to the face.

ROCKMASTER "16" cuts over-all blasting costs—saves time, labor, and dynamite. Blasters everywhere are calling ROCKMASTER "16" the greatest improvement in blasting methods since Atlas introduced milli-second blasting. Write for new booklet showing you where ROCKMASTER "16" fits into your operations.

ROCKMASTER "16" TIMINGS

Rockmaster No.	Avg. Time of Each Delay from Zero (milli-seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

ROCKMASTER: Reg. U. S. Pat. Off.

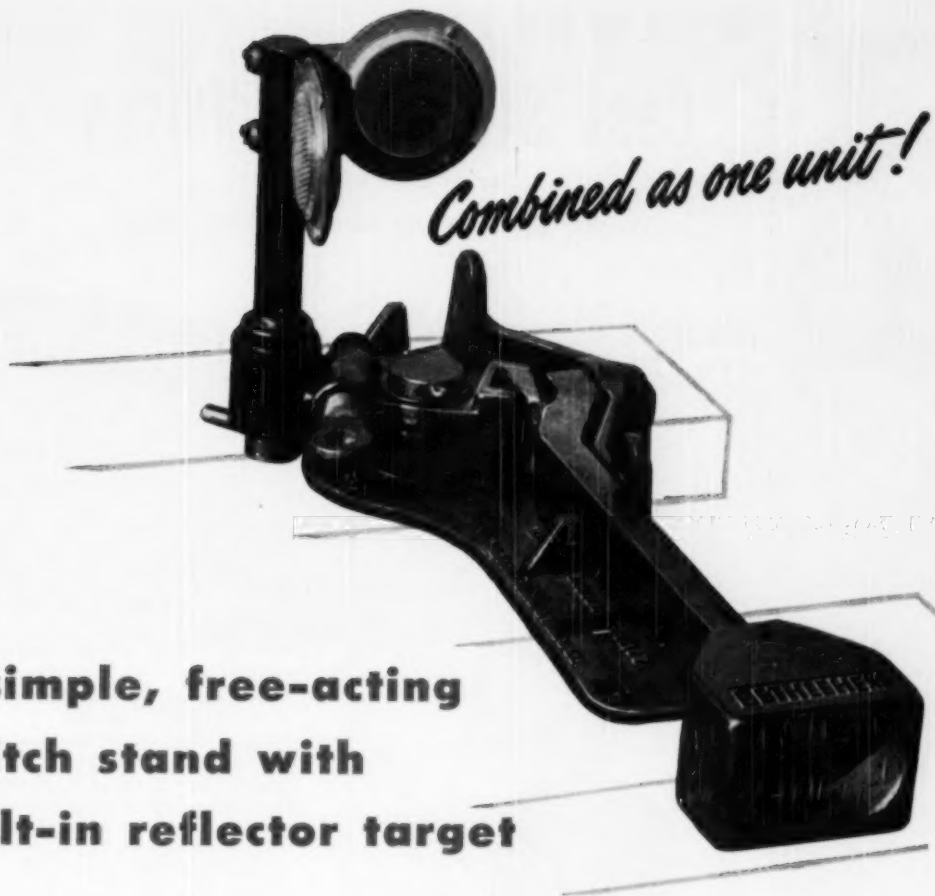
ATLAS

EXPLOSIVES

"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco



A simple, free-acting switch stand with built-in reflector target

Here's a compact Bethlehem stand-and-signal combination that involves NO installation problems. It's as easy to install as if the target weren't there.

Reason: the signal is an integral part of the switch stand itself. The need for an extra connecting rod has been eliminated. There are no extra holes to drill in switch rods. You don't even need a tie extension.

The target, which swings automatically through a 90-deg arc when the switch points are thrown, is equipped with 3-in. red-and-green Stimsonite reflectors. They stand out brilliantly when light is beamed on them. Because of this high visibility, the motor-man is able to control his trip with unusual safety. Positions of the red and green reflectors can easily

be reversed; simply remove two bolts and invert the target blade assembly.

Space is no problem. The top of the target is a bare 12 in. above the ties. It's hard to imagine anything more compact!

For full details, call the Bethlehem man nearest you. He'll be glad to explain the many advantages of this stand-and-signal combination.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

NOTE: the switch stand furnished is Bethlehem's Model 1217, which has been widely used for many years. It is available either with or without the target signal.

When the combination is ordered, specify Bethlehem Model 1217 Switch Stand with Reflector Target, and state whether Design 829 Spring Rod or Design 8-VM Rigid Rod is to be furnished.



WALWORTH

Cast Steel Gate Valves

Series 150 and 300

Wedge Gate — Outside Screw and Yoke



Sectional view of Series 300

Big 8-Point Superiority!

Gland clearances are such that stem cannot be scored if gland should be tightened unevenly.

Deep Stuffing Boxes in all sizes (2" to 24") insure tightness and maximum packing life — costly leaks are eliminated.

Bonnets and Bodies are engineered to withstand pressure and minimize distortion — they're tough, durable, dependable.

Heavy Steel Walls provide extra strength and longer life.

Integral Body Guide Rib Faces are machined to insure accurate disc seating.

Seat Rings are bottom seated — not flange type. No recess exists at back of ring — hence no turbulence, erosion, or pressure drop.

Streamlined Ports allow high velocity, non-turbulent flow, and reduce the possibility of erosion.

Valves regularly have flanged ends. They can be supplied with ends for butt welding. Roller bearing yokes are available. On valves 5 inches and larger, by-passes can be furnished.

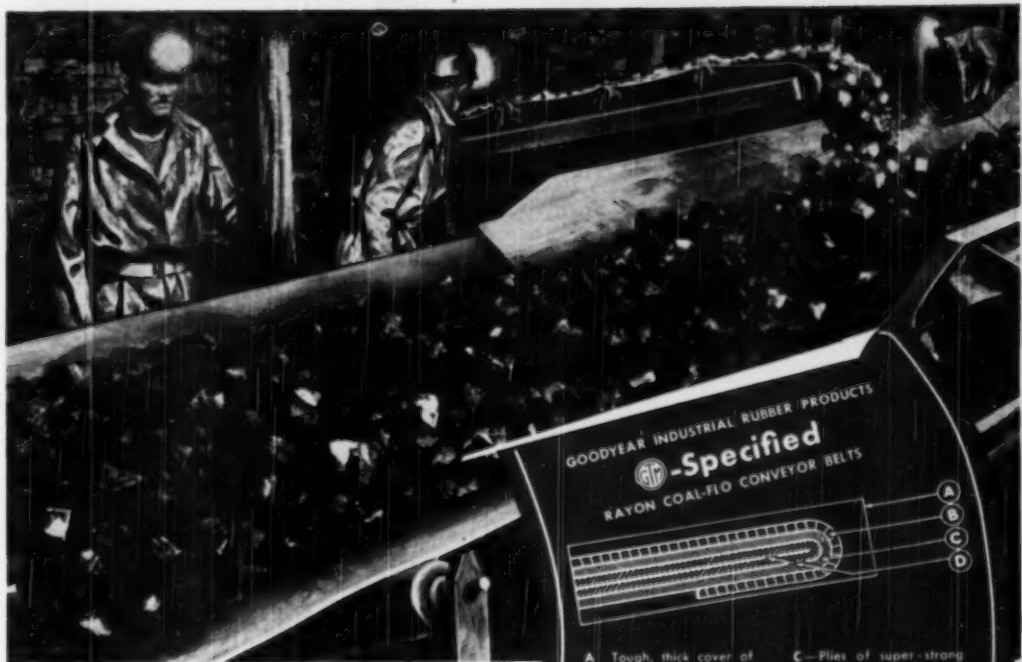
For Series 600 and higher, we recommend Walworth Pressure-Seal Steel Gate Valves.

For further information on Walworth Cast Steel Gate Valves, see your local Walworth distributor, or write:

WALWORTH
valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



Coal rides on Rayon

farther, longer, at lower cost

Now you can obtain Goodyear's famous Coal-Flo conveyor belts in two "tailored-to-the-job" constructions—one bodied with conventional fabric, the other with super-strong rayon. Proved by three years' service in West Virginia coal mines, the new rayon-bodied Coal-Flo gives you these outstanding advantages:

Greater strength—less weight.
A Goodyear rayon-bodied belt with

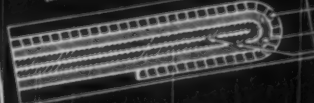
32-oz. fabric has 76% greater tensile strength than one built with the same weight of conventional fabric, even excels 42- and 48-oz. ducks. A 30-inch, 4-ply, 32-oz. rayon belt weighs about 1,200 pounds less per 1,000 feet compared with a standard 42-oz. belt.

On-the-job advantages. Rayon Coal-Flo belts can be operated over longer centers at higher tensions—

reduce number of transfer points. Lighter weight means easier handling, less power consumption. Thinner belts have less outer-ply stresses, reducing danger of breaks. Belts are more flexible, trough better.

Ask the G.T.M. for the facts on rayon Coal-Flo belts—and COM-PASS belts for longer runs and high-lift slopes.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
Specified
RAYON COAL-FLO CONVEYOR BELTS



A—Tough, thick cover of acid-resistant rubber

B—Sturdy horseshoe breaker protects ply edges from fraying and wicking acidic moisture

C—Piles of super-strong rayon fabric

D—Rubber skim-coat between plies increases flex life

TO CONSULT THE G.T.M. about hose, Rat belts, V-belts, molded goods, packing, tank lining, phone your nearest Goodyear Industrial Rubber Products Distributor, or write Goodyear, Akron 16, Ohio.

GOOD YEAR

THE GREATEST NAME IN RUBBER

Goodyear, Goodyear-Tire & Rubber Company

We think you'll like
"THE GREATEST STORY EVER TOLD"
Every Sunday—ABC Network



Top producer of them all . . . *McCarthy Drills*

Hundreds of successful operators rely on McCarthy Drills for their really tough jobs, because they know McCarthy Drills produce more footage at less cost in less time! These rugged machines have proved themselves in every test under the most difficult conditions. List of owners furnished on request.

SELF-PROPELLED HORIZONTAL DRILL

These tough, maneuverable units produce 40% more 6 to 8-inch blasting holes per day as they move about under their own power from hole to hole in the pit. The hydraulically controlled carriage travels a distance of seven feet, eight inches to provide ample clearance for the addition of six-foot auger extensions. Drills holes up to a horizontal depth of 120 feet. Finger tip control permits selection of any drilling speed up to six feet per minute and four individual self-locking jacks maintain correct drilling level during operation. Over-all length: 12 feet. Width: 5 feet, 8 inches.

VERTICAL DRILL

Here's a real time-saver for blast hole drilling of 6 and 8-inch holes practically designed for truck, half-track or caterpillar tractor mounting. The eight-foot tower is raised and lowered by hydraulic power and, when in traveling position, its over-all height is only seven feet, four inches. The auger is driven by an alloy shaft connected by a flexible chain coupling. The upper shaft section is 2½ inches square and drives through a lubricated sleeve located on top of the tower. Total weight: 4800 pounds.

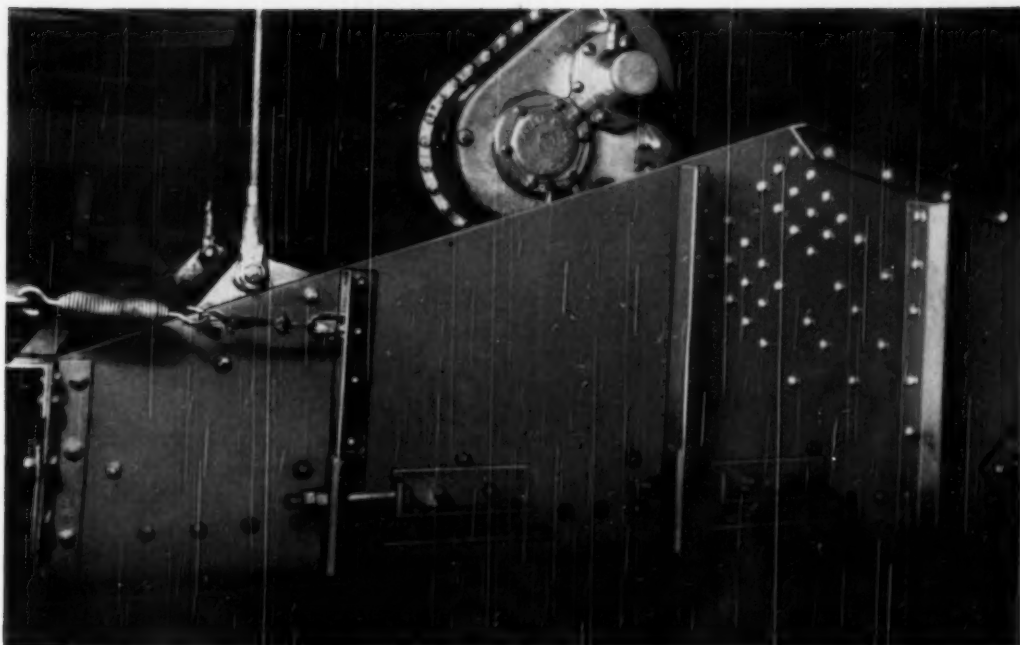
COAL RECOVERY DRILL

This machine is specifically built for recovering coal after further strip mining is unprofitable. A three-man crew can easily drill to depths of 100 feet or more. With 16, 20, 24, 30, 36 or 40-inch augers, a McCarthy Drill will produce from 60 to 150 tons of clean coal every eight hours for a total cost, including depreciation, of less than \$1.50 per ton! A special steel-gearred reduction unit, running in oil on Timken Bearings, transmits power through the heavy-duty transmission. Four speeds forward, one reverse are provided and the carriage travels a distance of eight feet. Over-all dimensions: 6 feet by 14 feet long. Total weight: 4700 to 5000 pounds. See your McCarthy Dealer today or write us direct for information.

Six-cylinder gasoline engine standard on all drills. Diesel or electric power units can also be supplied.

Manufactured by

The SALEM TOOL Co.
763 S. ELLSWORTH AVE., SALEM, OHIO, U. S. A.



Sludge Recovery Installation Paid for Itself First Month!

THIS LOW-HEAD dewatering screen — and the Allis-Chalmers solids handling pump that goes with it — reclaims 40 percent of the slurry from the settling cone underflow at Pyramid Coal Company's Victory mine, Seelyville, Indiana.

That amounts to 12 tons per hour of 8 x 28-mesh coal recovered. And it's a readily salable product, with average ash content only 9.9 percent and surface moisture 19 percent.

HERE'S HOW IT WORKS

- Slurry from settling cone (20 to 25 TPH of 8-mesh x 0" coal with 600 gpm of water) is passed over a wedge wire screen which removes 30% of the water.
- Then the slurry goes to the 5x14-ft Low-Head vibrating screen with end-tension deck shown above.
- Allis-Chalmers end-tension deck con-

struction creates a series of dams which turn bed of coal over repeatedly, assuring efficient drainage. Sprays near feed end help in sizing.

Since it was installed, this screen and pump combination has actually paid for itself several times over!

Sludge screening is only one way Low-Head vibrating screens are earning dollars for many coal operators. Other ways: Use of Low-Head screens with side tension deck for dewatering and sizing large coal . . . for pre-wetting ahead of heavy media units . . . for draining, washing and dewatering following heavy media units. Horizontal operation saves headroom, cuts installation costs.

The Allis-Chalmers representative in your area can show you how Low-Head screens may boost your profits. Call him, or write for Bulletin 25B6280B.

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

"TEAM UP" COAL PROCESSING EQUIPMENT WITH A COMPLETE ALLIS-CHALMERS DRIVE!



Motors — Controls



Texrope Drives

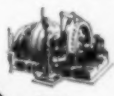
OTHER COAL EQUIPMENT



Vibrating Screens



Centrifugal Pumps



Hoists



Rectifiers



Low-Head is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Immediate Delivery

COMPLETE LINE

During the past few months, our plants at Pittsburg, Kansas, and Wellston, Ohio, have been working to build up a stock of crushers from which to make immediate delivery. But, even as large as the stock is, it may not be

McNally Pittsburg has prepared to meet your immediate needs

On these pages, we illustrate and briefly describe the crushers in greatest demand. If you need more detailed information regarding them to check with your requirements, write for Bulletins 416 and 427. They furnish dimensional drawings, together with complete specifying data for ordering.

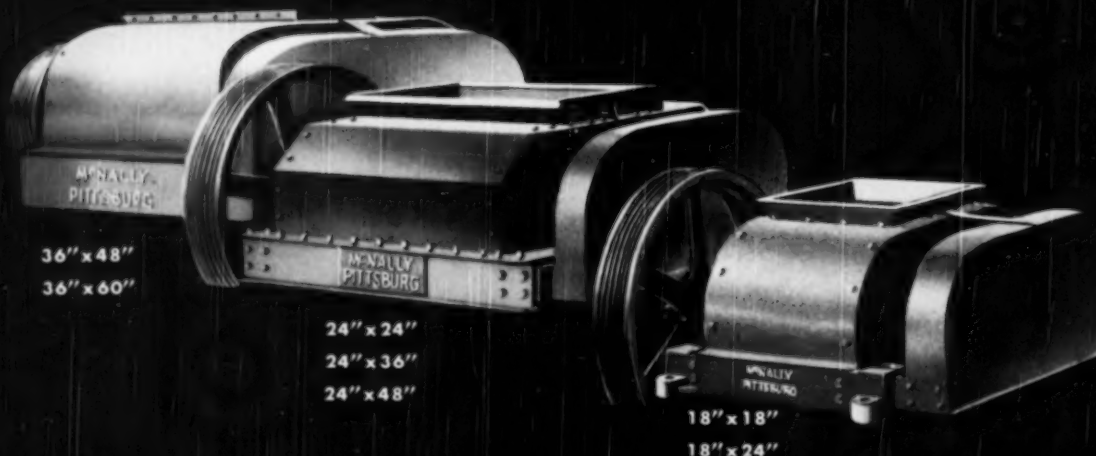


Single Roll Crushers

Three sizes in each of three types, Light Duty, Standard Duty, and Heavy Duty, offer a wide range of selection for primary crushing, middlings recrushing, or screenings production.

Stoker Coal Crushers

In seven sizes. For crushing egg and nut sizes to $1\frac{1}{4}$ " 1", or $\frac{3}{4}$ ", with a low production of fines in the finished product.



on Crushers

NOW AVAILABLE

sufficient to take care of all those who order this type of equipment the first three months each year. Our suggestion is that you anticipate your needs and get your order in at once.



Gearmatic Drive Stoker Coal Crushers

The latest engineering development in crushers for high volume production, infinitely variable to crushed resulting sizes, extra low percentage of fines in the product. Three sizes in both 24" and 36" roll diameters.

All crushers are equipped with Hi-Ten Cast Iron or Steel segments for utmost durability.

Engineering and consulting service available

The sketch to the right illustrates an ideal installation for volume production, embodying a twin stage circuit of first stage crushing and stoker coal crushing. Sizes are indicated in their flight from one stage to the other.

Such a circuit offers considerable flexibility in producing varying tonnages of several sizes. By changing Gate A, all coal will pass through the Stoker coal crusher, thus increasing

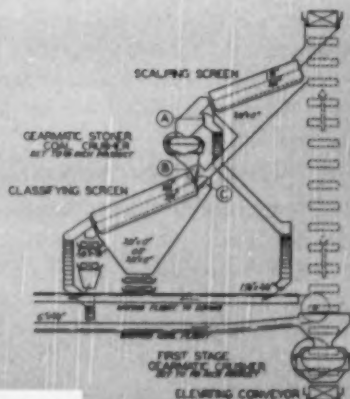
the volume of $\frac{3}{4}$ x $\frac{3}{4}$ inch and $\frac{3}{4}$ x 0 inch coal. By moving Gate B, the product can be changed to a high volume of plus $\frac{3}{4}$ inch. By leaving Gate B as shown in the diagram, and moving Gate C, the products can be changed to $\frac{3}{4}$ x $\frac{3}{4}$ inch, and $\frac{3}{4}$ x 0 inch; recirculating the plus $\frac{3}{4}$ inch.

If you have a problem in efficient production of small sizes, ask our Engineers to recommend the best way to re-design your present circuits.

Shipment made same day your order reaches us

But, naturally, speed like this is dependent upon our stock estimate of crushers needed to meet the demand being reasonably accurate. We sug-

gest, again, that you act promptly. Refer to Bulletins 416 and 427 for complete specifications. If you do not have them on file, write for them.



McNALLY PITTSBURGH

MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburgh Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio



Deep Overburden Meets Its Match...

... When long-range Bucyrus-Erie walking draglines like this 8- to 12-cubic yard 500-W go to work! Bucyrus-Eries have long reach and big capacity plus the proper balance of speeds and power that means smooth operation, instant power response for perfect control and a fast productive cycle. Each model is carefully designed to suit its work requirements.

Only Bucyrus-Eries have the rolling cam-walking mechanism, unequalled for simplicity, durability, low maintenance and shock-free movement. That's why Bucyrus-Eries quickly get to most effective working positions, walk safely and surely around obstacles or danger spots, over soft, loose or wet ground.

Bucyrus-Erie walking draglines work on a solid foundation, the center of gravity shifting only within predetermined, controlled limits. This keeps rim pressures low, prevents "coning" under the circular base and contributes to the fast operation that means sustained high output.

For the "years ahead" design that spells profitable production and outstanding dependability over the years, choose Bucyrus-Eries. Available in a wide range of sizes and capacities to fit your job requirements.



SOUTH MILWAUKEE, WISCONSIN

Another BWH First!



- Oil and Grease Resistant Cover
- High Tensile Steel Wire Braid
- Heat and Steam Resistant Compound
- New Wire Braid Tube

NEW CONCORD #20 STEAM HOSE

(with Wire Braid Tubel)

BREAKS ALL PERFORMANCE RECORDS!

1. During grueling test, Concord #20 Steam Hose "took it" for 1980 continuous hours of service at 200 lbs. steam pressure!
2. No interruption . . . full flow of steam was maintained during the entire test period. Pressure remained constant at all times!
3. Absolutely no evidence of hardening or swelling of the tube!
4. Amazing new construction locks tube between two braids of wire . . . makes recoupling quick and easy!
5. Cover is oil, grease, heat, sun and abrasion resistant!
6. Flexible and DURABLE . . . Your nearest BWH distributor will be glad to demonstrate the whip-like flexibility of Concord #20.

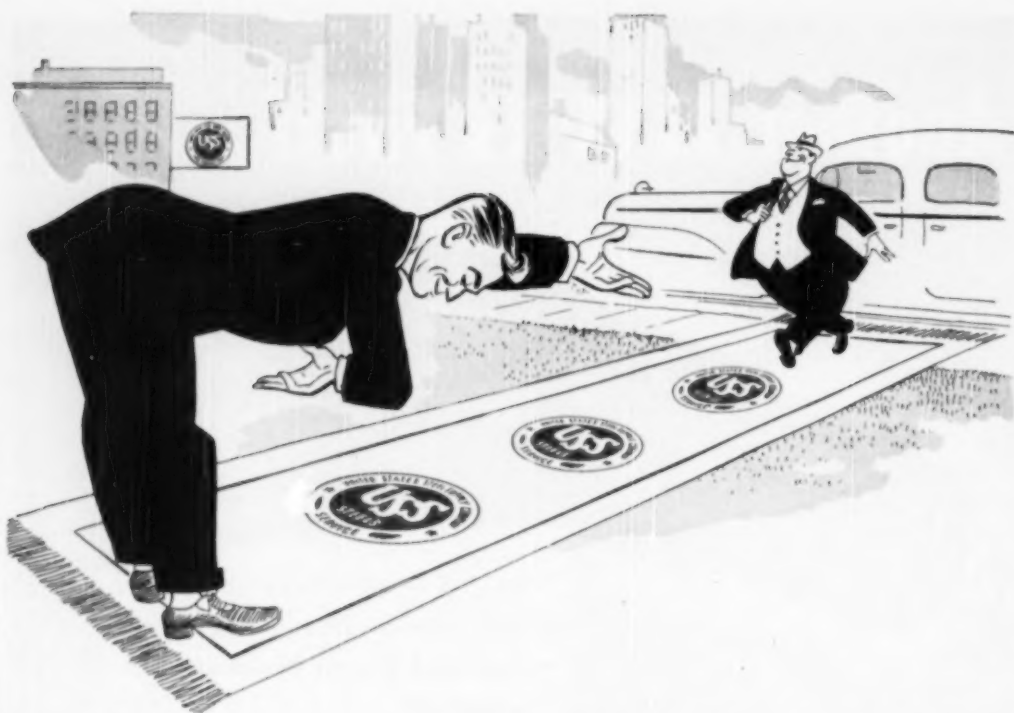
HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems. We're specialists in solving them. Consult your BWH distributor or write us direct.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS., U.S.A. • P.O. BOX 1071, BOSTON 3, MASS.



**"Courteous treatment by salesmen" . . . that's only
one of the things we mean by Service Plus!**

U-S-S HIGH STRENGTH STEELS
The steels that do more

COR-TEN · MAN-TEN · ABRASION-RESISTING
MANGANESE-NICKEL-COPPER
HOT ROLLED AND COLD ROLLED
FINISHED BARS · PLATES · STRUCTURALS
SHEETS · STRIP · STAINLESS · ALLOY STEELS
ALUMINUM · TOOLS · SUPPLIES · MACHINERY



● A recent survey of our customers impressed us again with the fact that "a company is only as good as its personnel!" Many customers told us that they like to do business with United States Steel Supply Company because of the courteous attention they receive from our salesmen. We're glad their efforts are appreciated and we assure you that every order you place, large or small, will receive prompt, courteous attention from men who know their business.

Service Plus is our pledge to handle your order as you want it handled. Our capacity to serve you includes a complete range of steel products, an unrivaled reputation for prompt delivery, and years of experience in providing the most complete steel service available.

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SUPPLY COMPANY**



Warehouses: BALTIMORE · BOSTON · CHICAGO

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Headquarters Offices: 208 S. La Salle St.—Chicago 4, Ill.

UNITED STATES STEEL



Photo courtesy of The United Electric Coal Companies

Today many coal buyers "write their own prescriptions." In ordering coal from the mines, they specify not only grade and size, but also carbon content, sulphur content, volatile matter, and heat value as well—in order to get exactly the kind that burns most efficiently in their equipment.

Quality control laboratories, like the one pictured above, make this possible. They are located right at the preparation plants of modern, mechanized coal mines. Here technicians check bulk samples—weighing, burning and analyzing each one. Their "lab" reports enable preparation plant superintendents to deliver the right coal to each customer.

Such scientific steps are only part of modern coal mining, which also includes million-dollar preparation plants, electric-powered shuttle cars, and high-speed conveyor belts, plus machines that drill, cut, dig and load coal. All these are the result of a far-sighted program of capital investment in mechanization that has made America's coal mines the safest, most efficient and productive in the world.

Working conditions in modern coal mines are far different in many ways than you may have thought. Today the miner scarcely touches pick or shovel. Indeed, he's a skilled operator of many specialized machines—like mobile power drills, cutters, loaders, shuttle cars, and high-speed conveyors. He works in clean, fresh air, too. In fact, more tons of fresh air are pumped into today's modern mines by giant fans each 24 hours, than tons of coal moved out. And for his work, the miner earns higher average hourly wages than are paid by any other major industry.

BITUMINOUS COAL

BITUMINOUS COAL INSTITUTE

A DEPARTMENT OF NATIONAL COAL ASSOCIATION

WASHINGTON, D. C.

BITUMINOUS COAL . . . LIGHTS THE WAY . . . FUELS THE FIRES . . . POWERS THE PROGRESS OF AMERICA

M-R-C's latest contribution to the
coal mining industry—the new **SYNTH-SEAL** bearing



the **M-R-C** *"Synthe-Seal"* bearing
FOR ALL SIZES

A standard-dimension ball bearing with a removable synthetic rubber seal for keeping out dirt, grit and moisture and for keeping in lubricant.

MARLIN-ROCKWELL CORPORATION, Jamestown, N. Y.



What's YOUR problem?



Oscar Doussman, lubrication specialist at Standard Oil's Evansville, Indiana, office solved the Landrey Mining Company's problem because he was thoroughly familiar both with the qualifications of his products and with the requirements of the job. He applied the lubricant that exactly met the customer's needs.

There is a corps of such lubrication specialists throughout the Midwest who are trained and experienced to help mine and plant operators solve similar problems. Experience enables these men to find quickly the cause of lubricating trouble. Knowledge of petroleum products enables them to prescribe the lubricant needed. There is one of these lubrication specialists at the Standard Oil Company (Indiana) office near you. He is there to serve you. A call or card will put him at your service.

Stops throw-off on dipperstick gears!

LUBRICANT throw-off from dipperstick gears on the shovel shown above brought trouble and expense to the Landrey Mining Company of Winslow, Indiana. The gears had to be greased once or twice each shift. This took time and labor, consumed lubricant by the pound.

A Standard Oil lubrication specialist persuaded company officials to try one of the Calumet Viscous Lubricants—No. 10X.

The results are reported by Ralph A. Landrey, president of the company. "After the first application, no additional lubrication was needed after one full week of operation. However, we added some lubricant because it seemed impossible that there could be any left on the gears. At the present time, we add Calumet Viscous Lubricant No. 10X about every three weeks. *We have not only extended*

gear life but have made a considerable saving in the amount of lubricant and in the labor required for application."

Savings such as these have been brought to a host of midwest mines by Standard Oil's lubrication engineering service and high-quality products. How these service and product advantages can help you is explained at the right.

**CALUMET
VISCIOUS
LUBRICANTS**

Investigate the cost-cutting possibilities of these lubricants

STANOIL INDUSTRIAL OILS

Here's one line of oils that provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

SUPERLA MINE LUBRICANTS

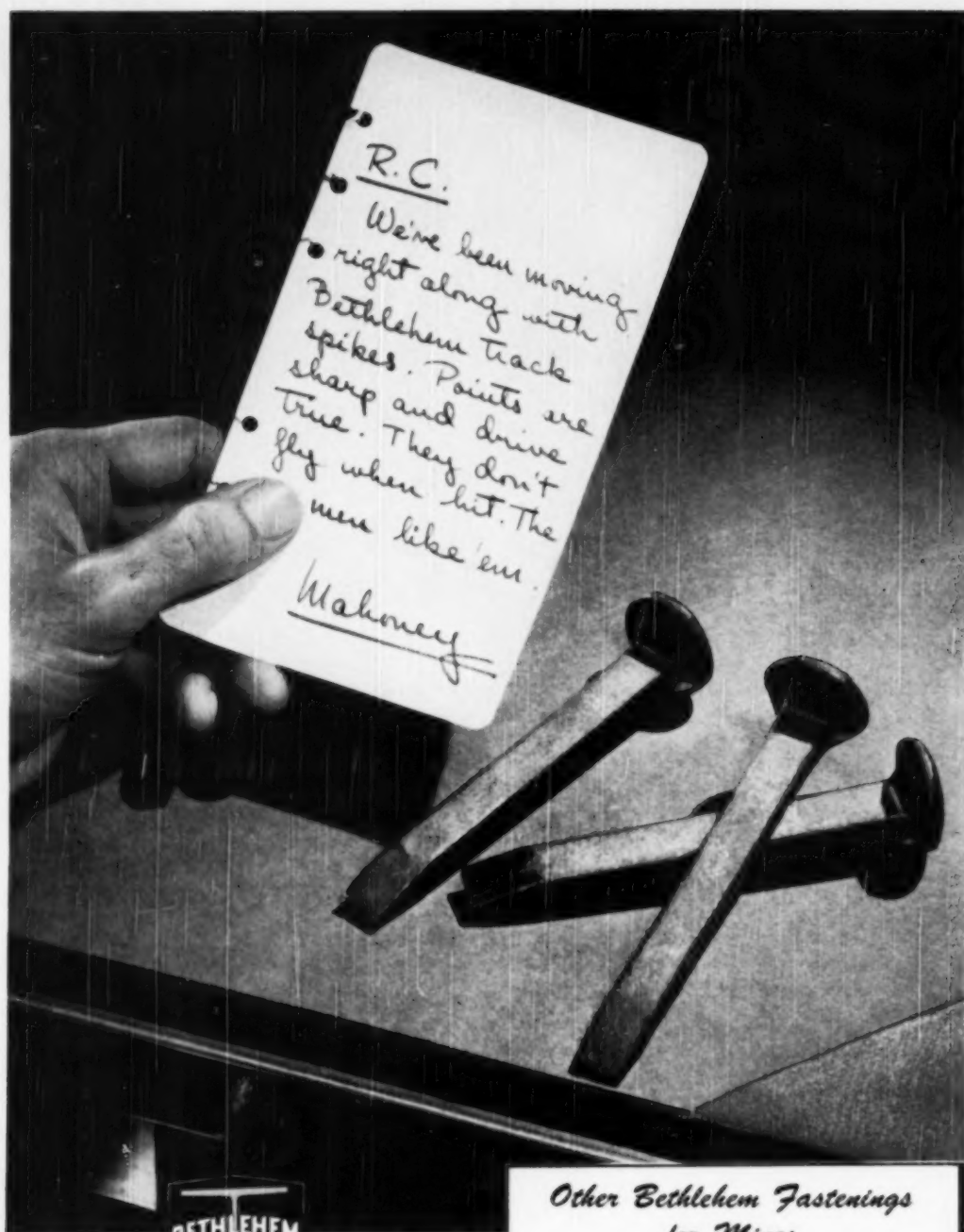
This new, improved line of oils and greases provides better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

CALUMET VISCIOUS LUBRICANTS

On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANDARD OIL COMPANY (INDIANA)





R.C.

We've been moving
• right along with
Bethlehem track
spikes. Points are
sharp and drive
true. They don't
fly when hit. The
men like 'em.

Mahoney

★  ★

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

*Other Bethlehem Fastenings
for Mines*

TRACK BOLTS

RIVETS

THREADED RODS

U-BOLTS

NUTS

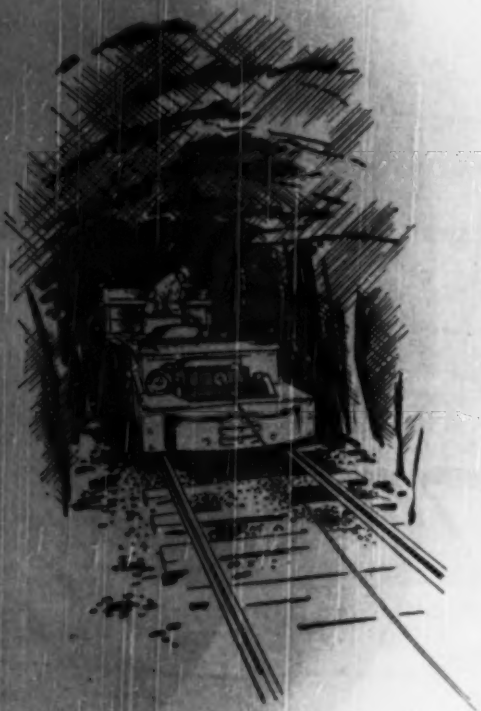
ROOF BOLTS AND ACCESSORIES

More service at lower cost... ROEPRENE Mine Locomotive Cables

THERE ARE A LOT of extras in Roebling ROEPRENE Mine Locomotive Cables. Their outer jackets, for instance, are "lead-mold" cured, a special process that makes them more dense, tough and resilient than ordinary jackets... better able to withstand light cuts, impact, abrasion, water and grease.

ROEPRENE Mine Locomotive Cables are outstandingly flexible. Their single conductor is insulated with a heat and moisture-resistant compound. The ROEPRENE sheath is bonded permanently to the insulation by open reinforcing cords. They are marked with the inscription "P-111-BM," which indicates approval by the State of Pennsylvania, Dept. of Mines, and full compliance with the requirements of the U. S. Bureau of Mines for flame-resisting mining cables.

There's a suitable Roebling Portable Power Cable for every sort of portable equipment, above or below ground. The right cable—your Roebling Distributor will gladly help choose it—will bring you longer working life and brand new economy. **THAT'S WHY**



Today it's Roebling!

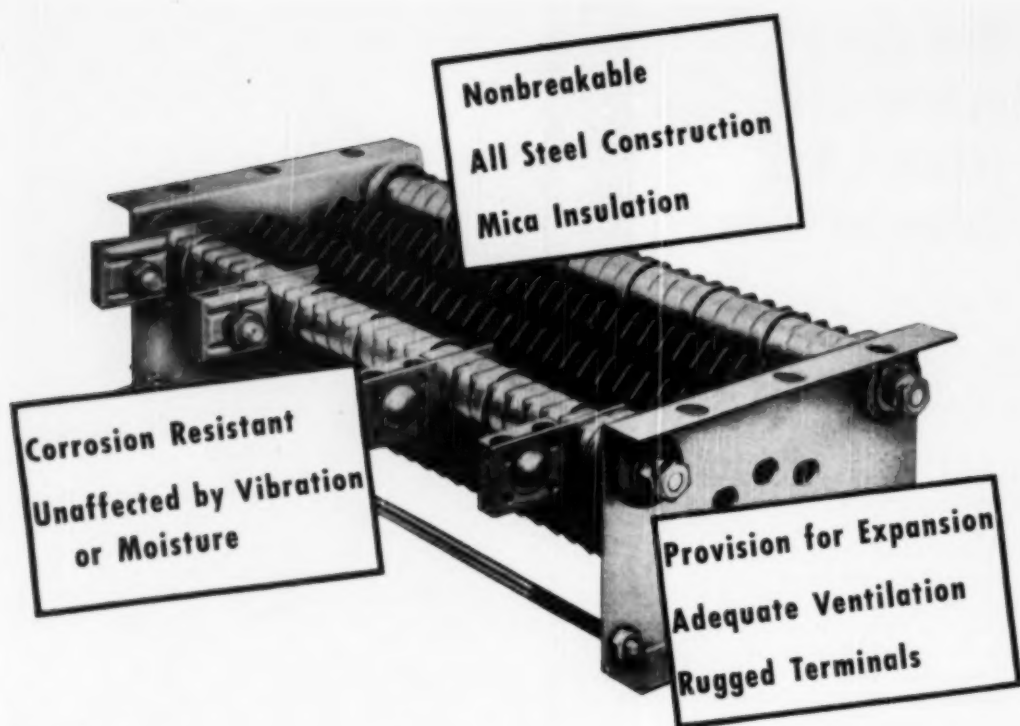
JOHN A. ROEBLING'S SONS COMPANY, TRENTON 2, NEW JERSEY

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From copper rod to finished cable, all components of Roebling electrical wires and cables are manufactured in Roebling's own plants. Finestaking care, research, engineering and modern production machines are your assurance of highest quality.



Thoroughly **TRIED AND PROVED!**

Steel Grid Resistors
for COAL MINES
Since 1915

P-G Steel Grid Resistors have four qualities vital to trouble-free resistor service. All steel construction, mica insulation, provision for expansion, and ample ventilation combine to produce the exceptional stamina necessary for long resistor life. In addition, P-G Resistors are not harmed by vibration, moisture or corrosive atmospheres. These characteristics coupled with correct resistance values and ample capacity ratings, assure longer resistor life, low upkeep and dependable performance. Try P-G on your next tough resistor application.



The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY

• EST. 1880 • 1940 •

221 WEST THIRD STREET, CINCINNATI 2, OHIO

**C'MON, IT'S HERE...
THE NEW P&H
955-A!**

**NO MORE FRICTION
SWING CLUTCHES
FOR ME...TRA-LA!**

**SEE THOSE
FAST STOPS
AND STARTS?
WITH
HYDRAULIC
CONTROL SHE'S
SMOOTHER
ALL AROUND**

**BOY! THIS IS IT!
MAGNETORQUE*
ELECTRIC SWING
ON A 2½ YARD
SHOVEL**

**IT'S A CONTRACTOR'S
DREAM FOR BIGGER
YARDAGE...LOWER
COSTS, TOO!**

**RUGGED? THIS BABY HAS IT..
JUST LIKE THE 1055!**

P&H EXCAVATORS
4540 West National Ave
Milwaukee 14, Wis.

HARNISCHFEGER
CORPORATION

Yes, the new 955A is a standout. And almost a sellout, too! This 2½ yard shovel, a smaller version of the famous P&H Model 1055, can be shipped completely assembled. Lower digging costs in 2½ yd. capacity are important to you, so it's important that you check the P&H 955A right now. Get your copy of bulletin X-122 now!

*Trademark of Harnischfeger Corporation for electro-magnetic type clutch

LOOK TO P&H FOR ADDED VALUES

Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizers • Crawler and Truck Cranes • Diesel Engines
• Crane Loaders • Preassembled Homes

FIGURES SPEAK LOUDER THAN WORDS

OPERATING AND BEING
BUILT DECEMBER 1949

75

OVER 100%
INCREASE

IN ADOPTION OF
HEAVY-MEDIA SEPARATION

IN JUST 1 YEAR!

PLANTS
BUILT THROUGH
DECEMBER 1948

31

HEAVY-MEDIA SEPARATION PLANTS ARE
NOW OPERATING AND BEING BUILT
IN 18 STATES, ALASKA, CANADA
AND 6 FOREIGN COUNTRIES.

BUILT THROUGH
DECEMBER 1948

4

COAL PREPARATION PLANTS

OPERATING AND BEING BUILT DECEMBER 1949

ANNUAL CAPACITY OF PLANTS OPERATING AND
BEING BUILT - APPROXIMATELY 20 MILLION
TONS. SOON EVERY 30TH TON OF COAL WILL
BE PREPARED TO EXACT, PRE-DETERMINED
SPECIFICATIONS BY HEAVY-MEDIA SEPARATION.

28



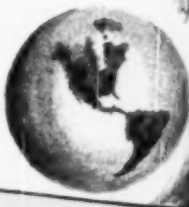
COAL PREPARATION CAPACITY

TONS PER YEAR 1949 vs 1948

UP 436%

**FROM DIAMONDS TO GRAVEL
WORLD-WIDE ACCEPTANCE
ON THESE 15 FEEDS!**

**BITUMINOUS COAL • BARITE • LEAD-ZINC ORE • GRAVEL
FLUORSPAR • ANTHRACITE COAL • TIN ORE • GARNET
IRON ORE • DIAMONDS • LEAD ORE • SPODUMENE
ZINC ORE • ANDALUSITE • MAGNESITE PROVES
THE ECONOMY AND EFFICIENCY OF
HEAVY-MEDIA SEPARATION.**



Why has Heavy-Media Separation made such phenomenal progress in a few short years? Why is it used in the world's largest bituminous preparation plant? Why have the two largest bituminous producers installed Heavy-Media Separation? Why do so many quality-minded operators use Heavy-Media Separation in custom-built and "packaged" plants of all sizes from 10 tons per hour up?

Because—Heavy-Media Separation makes an infallible separation of "pre-determined specification" coal even from near-gravity refuse by reason of the slightest difference in their specific gravities. This is extremely important where a large percentage of near-gravity material is present.

Because—Heavy-Media Separation is the only coal cleaning process that closely duplicates "heavy liquid" results over a full size-range at any gravity from 1.25 to 2.00.

Because—Heavy-Media Separation is the only coal cleaning process that can provide automatic, continuous and complete removal of large and variable amounts of refuse without volumetric limitation.

Because—Heavy-Media Separation makes an amazingly sharp separation... maintains the desired separating gravity within ± 0.01 ... never changes its separating efficiency because of intermittent feed or a sudden increase in the refuse content of raw coal.

No other process even closely approximates this combination of economy, high recovery and range of applicability!

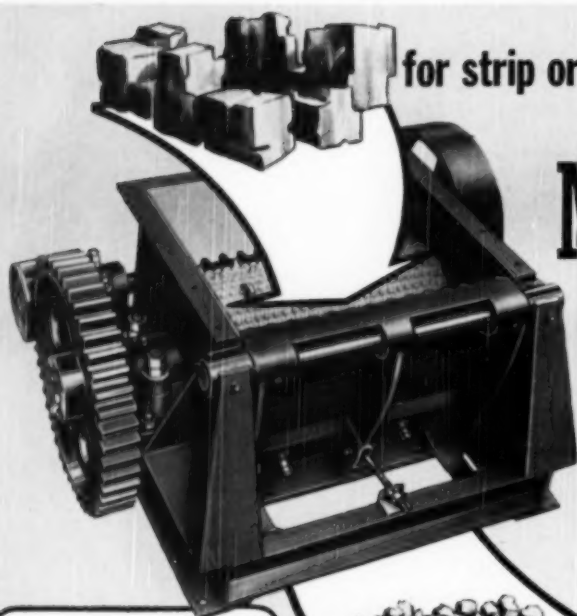
Prefabricated Heavy-Media plants with capacities up to 300 tons per hour are available for prompt delivery and speedy erection. Larger Heavy-Media units can be quickly designed through the accumulated experience of several well known engineering firms. With no self-interest in equipment manufacture or plant construction, Cyanamid can give you sound counsel based on unprejudiced tests in the Cyanamid Mineral Dressing Laboratory and Pilot Plant at Stamford, Conn. We will also cooperate with engineers of your choice on plant design and provide a Cyanamid Field Engineer to tune-up your Heavy-Media unit. Your inquiry is invited.

AMERICAN *Cyanamid* COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA

NEW YORK 20, NEW YORK



for strip or underground operations...

McLANAHAN

Bantam Buster

SINGLE ROLL

CRUSHERS

- Heavy Duty Rock Crushers — Automatic Steelstrut Toggle, Quick Adjustment and Pioneer series
- Light Duty Single Rolls — Black Diamond and Bantam Buster in steel, semi-steel or fabricated frames
- Double Roll Fabricated Steel Crushers
- Jaw Crushers
- Portable and Semi-Portable Crushing Plants
- Dry Pans Super Heavy Duty
- Conveyors
- Dryers of Revolving Type
- Elevators
- Feeders
- Hoists
- Ore Jigs
- Screens
- Log Washers & Scrubbers
- Special Machinery and Complete Plants



• HIGH-RATIO REDUCTION

• LOW INITIAL COST

• TROUBLE-FREE MAINTENANCE

• PORTABLE—Self-contained units

The McLanahan Bantam Buster Fabricated Steel frame crushers answer the need for a dependable, low cost machine that does the job with minimum operating and maintenance expenses. These rugged, high-ratio crushers take a larger feed than equivalent crushers. They easily crush different size feeds of hard and soft coal to various size products.

Available in many sizes 18", 24" and 30" diameters. They are adaptable for most any installations. The crushing plate is hinged to permit different adjustments; alemite lubricated bab-bitted or roller bearings carry the roll and counter-shafts, cut gears. Safety protection and adjusting.

Write for descriptive technical bulletins.

Headquarters for Pit, Mine and Quarry *Modernization*

McLANAHAN and STONE Corp.

HOLLIDAYSBURG, PA.

Since 1835

now for the first time...

...A HIGH-VOLTAGE INSULATION WITH ALL THE PROPERTIES NECESSARY FOR TROUBLE-FREE SERVICE UNDER ALL OPERATING CONDITIONS...

LOW
WATER
ABSORPTION

OZONE
RESISTANCE

SIMPLEX-ANHYDREX XX NEOPRENE

RESISTANCE
TO
HEAT and AGING

SIMPLEX-ANHYDREX XX

Here at last, in the new Anhydrex XX insulation, is the combination that assures dependable, low-cost cable performance under all conditions of high-voltage service. And in Anhydrex XX none of the effectiveness of one property has been sacrificed to gain the others.

Aged in an air oven for sixteen weeks at the grueling temperature of 250 F. (121 C.) Anhydrex XX remained rubber-like in quality and appearance, was still suitable for continued use. It retained approximately half of its tensile strength, nearly two-thirds its elongation. Most important of all, its rate of deterioration after the first few weeks was very slight, indicating exceptional stability and long life.

Ordinary oil base and heat-resistant compounds could not match this performance. Inside of only three weeks both had become brittle and, upon bending, immediately cracked and crumbled.

Aged at the same high temperature for seven days, Anhydrex XX was immersed for a week in distilled water at 158 F. (70 C.). It would not absorb more than 15 mg. per square inch of exposed surface. Bent around a mandrel, it was exposed to .03% ozone for four hours yet would not crack.

Anhydrex XX is the only insulation that provides this valuable combination. So that you may determine fully the effectiveness and stability of these properties even after years of service, we have drawn up an ironclad specification for Anhydrex XX which we will gladly send you upon request. Simply fill in and mail the coupon below.

SIMPLEX WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 Sidney St., Cambridge 39, Mass.

SIMPLEX WIRE & CABLE CO.
79 SIDNEY ST., CAMBRIDGE 39, MASS.
GENTLEMEN: PLEASE SEND A COPY OF SPECIFICATION 1685 TO:
NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY _____ STATE _____



On to stay... with 3 sharp blows

No welding—no lugging of heavy equipment—is required when you install American Wedge Type Bonds. A drill and a hammer is all that is needed for the complete installation. Just three sharp blows to each wedge and the bond is on. Wedge Type Bonds are great savers of time and labor. One man can install several Wedge Type Bonds in the same time it would take to make one weld.

These long-lasting bonds have copper terminals and wedges of drop-forged steel. They have high resistance to vibration stresses, will keep power flowing for years.

Although Wedge Type Bonds are designed primarily for temporary trackage, many mines have found them to be so dependable and long-lasting that they use them for permanent trackage. When used for temporary trackage Wedge Type Bonds can be re-used again and again... just hammer out the wedge and the bond is ready for use on a new track.



AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES, CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
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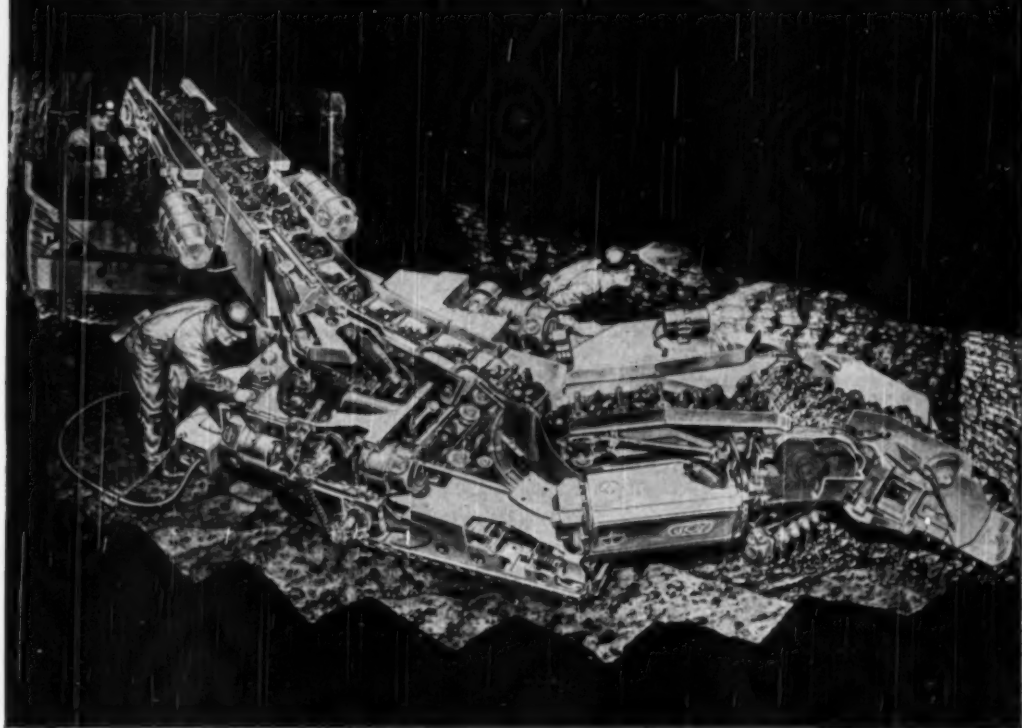


American Tigerweld Rail Bonds

UNITED STATES STEEL

MIGHTY MINER DIGS COAL

WITH HELP FROM THE WORLD'S GREATEST LUBRICATION KNOWLEDGE



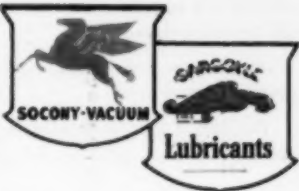
You're looking at the inside story of a mining miracle come true. It's a mighty mechanical miner that rips into a seam of coal, passes it back and loads it for haul-away. The machine mines two tons of coal per minute.

An ingenious combination of gears, bearings, pistons and motors, this machine posed a challenging problem to lubrication engineers. Pioneering with the builder (Joy Manufacturing Company), Socony-Vacuum has furnished the

right lubricants for every moving part.

Those ripper-head gears are protected by a special shock-resistant Gargoyle Oil. Those hydraulic cylinders are filled with another long-service Gargoyle product and those heavily loaded bearings are guarded by still another Gargoyle oil.

This mechanical marvel gets our complete lubrication program, skilled engineering service backed by 83 years' experience. You, too, can put this program in your plant for more continuous output.



SOCONY-VACUUM OIL CO., INC.
and Affiliates: MAGNOLIA PETROLEUM CO.
GENERAL PETROLEUM CORPORATION

Rely on **SOCONY-VACUUM** *Correct Lubrication*



Republic Cuts Costs By The Mile!

● That's a mile of Republic Rubber Conveyor Belting cutting across the wooded landscape above. It's one of the world's longest continuous decline conveyor belt installations and a substantial money saver when it comes to reducing handling costs!

Republic built this belt for the Pruden Coal & Coke Company at Pruden, Tennessee, where it is used to convey the entire output of the mine. The coal moves straight from the hillside mine portal, down a 300-foot decline and is delivered across the valley to the washing plant.

Imagine the savings that result from this Republic installation!

The belt is mildew-proofed by Republic's exclusive Provar process. It's particularly

immune to the wearing action of the coal. Its use has eliminated all traffic problems, since one man controls the entire operation by simply pressing buttons.

Perhaps, there is a cost-saving idea for you here. Contact your nearby Republic Distributor and see.

Whether your job is large or small, he's ready with expert advice that means savings for you — the same kind of savings that Republic's Distributor in Jellico, Tennessee, the McComb Supply Company, made available here.

Remember, Republic Rubber has been the specialist in mechanical rubber goods for more than 48 years, and every product made is matched to give you the longest and most economical service.



Mr. J. W. Baile, President
McComb Supply Company
Jellico, Tennessee



Pioneers in the use of COLD RUBBER

REPUBLIC RUBBER DIVISION

LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN, OHIO
Lee Delano Tires & Tubes • Conchohockes, Pa.

MECHANICAL RUBBER GOODS BY
**REPUBLIC RUBBER
DIVISION**

tough jobs have long been

the

PROVING

GROUNDS

for

"HERCULES"

RED-STRAND
WIRE ROPE

© 1958 A. LESCHEN & SONS

Many wire rope users who keep an eye on their operating costs have proved by the accurate yardstick of performance that "HERCULES" (Red-Strand) Wire Rope provides longer wear . . . faster and more continuous work . . . increased profit.

Such results are never a matter of chance; definite policies involving materials, manufacturing methods, equipment and experience, insure them.

Made in Round Strand and Flattened Strand constructions, Preformed or Non-Preformed; there is a correct type for every purpose.

MADE ONLY BY



A. LESCHEN & SONS ROPE CO.

ESTABLISHED 1857

We invite your inquiries.

5909 KENNERLY AVENUE • ST. LOUIS 12, MISSOURI

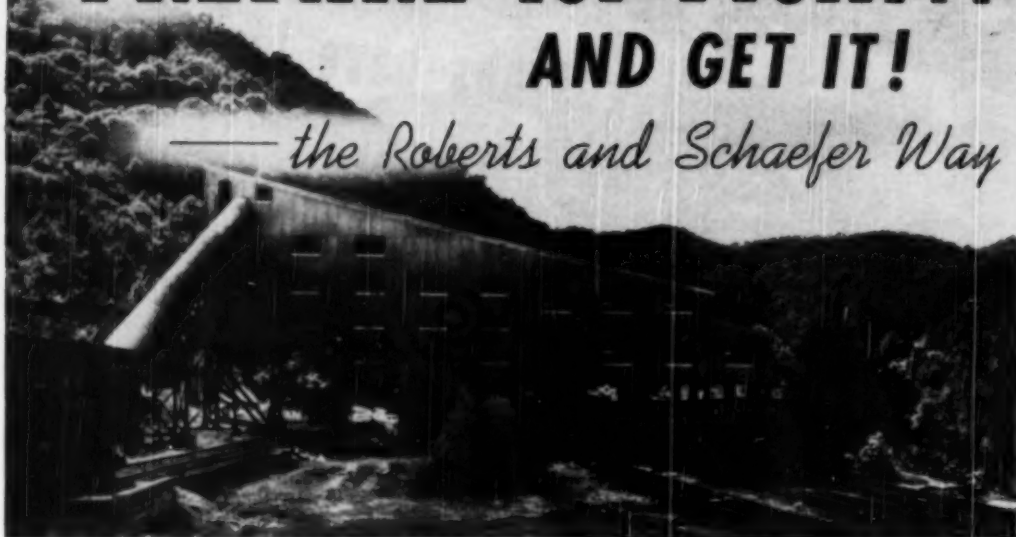
New York 6
Chicago 7
Birmingham 6

Houston 3
Denver 2
Los Angeles 21

San Francisco 7
Portland 9
Seattle 4

PREPARE for Profit... AND GET IT!

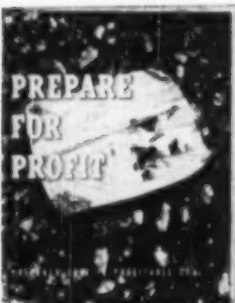
— the Roberts and Schaefer Way



Mammoth Washery, Warner Collieries Co.
Mammoth, W. Va.



Peter's Creek Coal Co., Summersville, W. Va.



A short note on your company letterhead will bring you a copy of the new 20-page booklet, **PREPARE FOR PROFIT** . . . featuring stories of how other plants are solving their preparation problems the *RandS* way. Write today—your copy will be forwarded immediately.

IN PENNSYLVANIA, ALABAMA, WEST VIRGINIA . . . wherever coal is prepared, there you'll hear stories of *RandS* success. There, you'll find testimonials to the functional design and operating efficiency of Roberts and Schaefer Coal Preparation Plants.

Why?

Because Roberts and Schaefer Preparation Plants are engineered and constructed to solve each individual problem . . . produce premium coal at premium prices . . . operate to their owners' complete satisfaction and greatest profit. In one short sentence: *RandS*-engineered plants do the job they are intended to do. And when you consider the 40-odd years of *RandS* experience that go into their planning and construction—you know that success is inevitable.

But look at your own plant, and ask yourself these three questions: Does it measure up to increasing competitive pressure? Is it still producing regular-price coal while competition is getting premium prices? Are the benefits of modern mining methods being lost because your plant is obsolete? If you have any doubts concerning any of these fundamental questions, it's worth talking about . . . with experts. *RandS* engineers invite you and your problems—and there's no obligation.

ROBERTS and SCHAEFER CO.

130 North Wells Street, Chicago 6, Illinois

2801 Broadway Ave.
PITTSBURGH 16, PA.

P. O. Box 570
HUNTINGTON 18, W. VA.

224 West 54th Street, NEW YORK 16, N. Y.

How to simplify lubricant storage and handling:



use { **Gulf Mining Machine Lubricant B**
for lubrication - it does the job of 2 or 3 other lubricants
Gulf Journal Oil B
for hydraulic systems

With Gulf Mining Machine Lubricant B and Gulf Journal Oil B you can service almost any mining machine—and you eliminate as many as 4 oils and greases! Thus your lubricant storage and handling are greatly simplified and you avoid application errors at the face.

Gulf Mining Lubricant B and Gulf Journal Oil B not only do the job of several other oils and greases, but do it better! Gulf Mining Machine Lubricant B has a heavy body to insure less leakage from gear cases; exceptional adhesiveness that prevents throwoff or channeling; higher lubricating value that insures less wear; and it resists the washing action of water.

Gulf Journal Oil B gives outstanding protection to hydraulic pumps—helps maintain system efficiency!

Call in a Gulf Lubrication Engineer today and ask him to explain in detail how these two Gulf

quality products for cutting and loading machines can give you effective help in your efforts to increase tonnage and reduce costs. Write, wire, or phone your nearest Gulf Office.

GULF OIL CORPORATION • GULF REFINING COMPANY

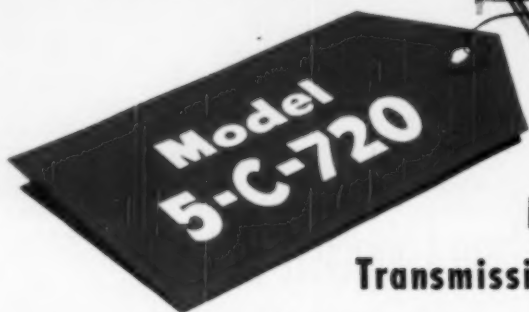
GULF BUILDING, PITTSBURGH, PA.

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Located in principal cities and towns throughout
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Add one more
to the FULLER
line of five speeds



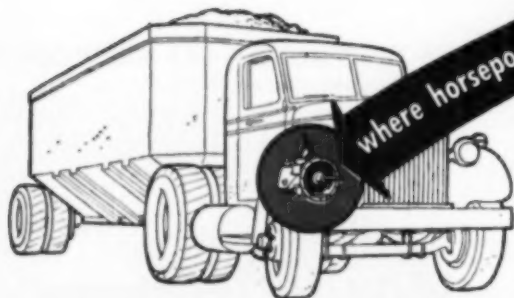
Here is a NEW FULLER Transmission...the Model 5-C-720

Third of the all-helical geared five-speed Fuller Transmissions, Model 5-C-720 completes the line of heavy-duty units designed to cover a range of engines developing 150 to 300 hp.

All-helical gearing permits compact design, and:

- Shorter, easier shifts
- Quiet operation
- Longer life
- Low weight—high capacity

Write now for engineering details.



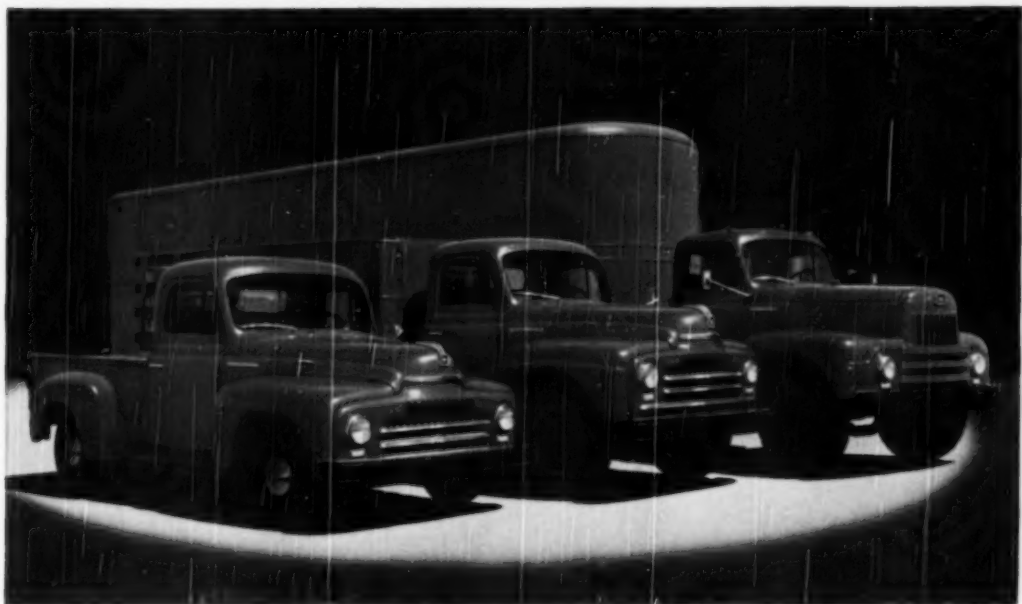
where horsepower goes to work



FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1040 E. 11th Street, Oakland 6, Calif.

Announcing-**ALL NEW-ALL PROVED** **INTERNATIONAL TRUCKS**



Every model *Heavy-Duty Engineered* to save you money!

Now International puts you squarely in the driver's seat—with a complete new line of completely new trucks!

Every single new International Truck from 4,200 to 90,000 pounds GVW is heavy-duty engineered to give you lower maintenance and operating costs.

Let the facts tell that story:

Fact No. 1: for 18 straight years Internationals have

led in sales of heavy-duty trucks (16,001 pounds and over GVW). The men who buy heavy-duty trucks buy on a basis of performance. They choose Internationals.

Fact No. 2: the same management men, the same engineers, the same test experts, the same production men who kept Internationals first in the heavy-duty field, have developed every new International Truck.

Every model offers new high standards of comfort and easy handling



Here's relaxing roominess! Here's all 'round visibility! Here's a comfortable, adjustable seat! Yes—you get everything in the Comfo-Vision Cab!

You have full visibility in the one-piece Sweep-sight



windshield. That convenient two-cluster instrument panel puts everything right in front of your eyes.

And when the truck starts to roll, you find that new Super-steering right for position, and positive control.

AND TALK ABOUT FEATURES...

Every new International Truck offers new improvements throughout!

NEW Functional Styling—Smart brawny appearance combines modern design with extreme practicability.

NEW Outdoor Visibility—Giant, one-piece scientifically curved Sweepstake windshield, large side windows, two rear windows.

NEW Comfo-Vision Cab—Model for model "the roomiest cab on the road"—with comfort cushions, adjustable seats, controlled ventilation.

NEW Super-Maneuverability—More positive control from a more comfortable position; new wide-tread axles assure the shortest practical turning circle and greater stability.

NEW Engine Accessibility—Special fender and hood design provides extra working space between engine and fenders—hoods easily removed.

NEW Valve-in-head engines—All test-proved for greater power, greater economy, greater stamina, greater efficiency.

NEW Specialized Transmissions—Types and gear ratios for any job... three-speed, four-speed and five-speed with direct drive or overdrive in 5th.

NEW Rear Axles for any job—Wider, sturdier rear axles—hy-poid single-speed, double-reduction and two-speed with electric shift.

NEW Brake Systems—hydraulic or air. Faster-acting, surer-stopping, longer-wearing—more efficient braking with less effort.

NEW Steel-flex Frames—Designed to provide an extra margin of strength combined with the right amount of flexibility.

NEW Load-balanced Wheelbases—Shorter wheelbases for standard body lengths provide better load distribution, better maneuverability.

NEW Cradle-Action Springs—Longer springs for greater riding ease... stronger springs, sturdier mounting and new spring suspension for longer life.

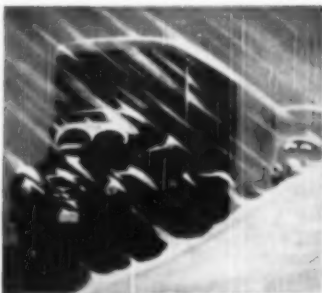
Plus dozens of new features and refinements throughout every truck!



Proved in the mountains!



Proved on the Belgian Blocks!



Proved in heavy snowfall!



Proved on the twist course!

Every model proved under actual operating conditions!

There wasn't any price tag on the test program to prove the new International Trucks.

It was directed by men whose life work has been to develop better truck transportation. Test drivers were chosen as carefully as you do any key workers. All-outdoors was used for proving grounds. Laboratory analysis tests were backed up by track tests, then by actual road tests. Test convoys were run 'round the clock.

That's why every all-new, all-proved International Truck is right and ready for you now!

Call or visit your International Truck Dealer or Branch

International Harvester Builds McCormick Farm Equipment and Farmall Tractors... Motor Trucks Industrial Power... Refrigerators and Freezers.



Tune in James Melton and "Harvest of Stars"
NBC, Sunday afternoons

INTERNATIONAL



TRUCKS

INTERNATIONAL HARVESTER COMPANY

CHICAGO

*Have we been getting
the BEST Rope Value?*



Frequent question, when a wire rope has worn out and needs replacing. Has it given you your money's worth? Has it cost you a little or a lot for every unit of work it's done?

In the case of wire-rope performance, Bethlehem has always advocated keeping records; something to indicate the amount of service a rope gives its owner. For instance, that rope you're about to replace—how many ton-miles did it account for during its working life? Or how many yards of rock did it move? Or how many tons of coal did it haul?

Recording such figures gives a basis for comparing

different brands of rope. We urge it because we know that Bethlehem wire rope is a durable, long-lasting product, one we're glad to stack against the field. By any standard you care to name, it's a sound, economical purchase—something you can easily prove by putting Bethlehem rope on the job and checking your records periodically.

If you're one of the thousands who use Bethlehem wire rope, stick with it; you've got a mighty fine product working for you! If, on the other hand, you haven't yet tried it—get some! . . . then let your records show what a "buy" you've made!

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

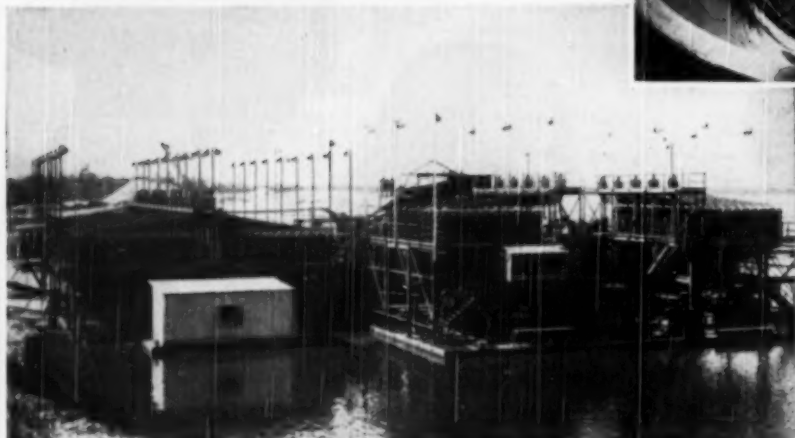
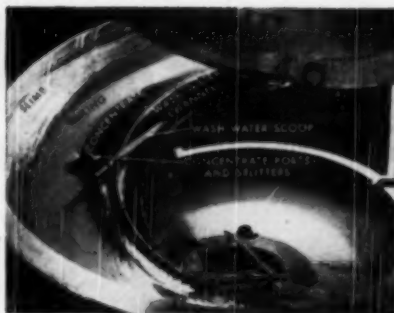
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

When you think WIRE ROPE . . . think BETHLEHEM



HUMPHREYS SPIRAL CONCENTRATOR

*Low cost of installation • Low operating costs
No moving parts*



Concentrating action Humphreys Spiral.—Note wide black band of concentrate entering upper outlet, which is set for a wide cut, also narrow black band of middling entering lower outlet set for thin cut. In cleaning fine coal, refuse and middling are discharged from the concentrate ports and cleaned coal follows the path shown as tailing above.

View of 1004 Humphreys Spiral Concentrators used for recovery of ilmenite, rutile and zircon from beach sands at Starke, Florida mine operated by Humphreys Gold Corporation for E. I. du Pont de Nemours & Company. Spirals are mounted on barges floating in dredge pond, one barge supporting 704 first stage spirals with pumps, another barge supporting 200 second stage and 100 third stage spirals with pumps. Capacity of 704 rougher spirals is 1100 tons per hour original feed.



Closed circuit test unit utilizing a full size spiral concentrator in Denver testing laboratory.

- ★ *for* separation of minerals of different specific gravity in ores at sizes generally minus 10 mesh.
- ★ *for* cleaning minus ¼ inch bituminous or anthracite coal.
- ★ *for* recovery of liberated values too coarse for flotation.
- ★ *for* recovery of values too fine to be economically treated by heavy-media separation.

HUMPHREYS SPIRALS have been used in full-scale plant operation for concentration of chromite, rutile, ilmenite and zircon from sands; for concentration of ground ores for recovery of lead and zinc; for concentration of molybdenum flotation mill tailing for recovery of tungsten; for concentration of fine iron ore; for separation of fine phosphate rock from sand; for cleaning minus ¼ inch coal; for concentration of pyrite from flotation mill tailing; for concentration of fine gold and gold bearing minerals; and for recovering mica and barite.

The installation, operating and maintenance costs of Humphreys Spirals are so low that economical concentration of materials which could not heretofore be worked at a profit, is now possible. There are no moving parts, no vibration, weight per unit of capacity is light and requires only a light foundation. Floor space per ton treated is very small.

A testing laboratory is maintained in Denver by the Engineering Division of the Humphreys Investment Co. Results obtainable in a full size plant may be determined by tests of a representative sample of minerals or coal weighing 300-500 lbs.

FOR DESCRIPTIVE BULLETINS, WRITE

**THE HUMPHREYS INVESTMENT COMPANY
ENGINEERING DIVISION**

906 FIRST NATIONAL BANK BLDG.

DENVER 2, COLORADO

CUT COAL COST $\frac{4}{10}\%$ PER TON in Shuttle Car Sections with Battery-Powered Shuttle Cars

Battery-powered shuttle cars have the following advantages demonstrated and proved:

SAFETY

Only battery cars are "permissible"

PRODUCTION

Can produce 10% more tonnage
Deliver more tons per man shift
Give 22% more ton-miles per shuttle car hour

PERFORMANCE

Include all design advances
Travel 25% faster
Discharge 30% faster
Are more dependable and predictable
Handle supplies easier
Reduce shuttle car change time
Can gob underground
Promote section efficiency

COST

Equal capital cost
Produce coal in shuttle car sections for approximately $\frac{1}{3}$ less per ton**
—in hand-loaded sections, as much as 75¢ a ton

**Shuttle Car Haulage, AIME, Technical Publication No. 2198.

A "MUST" FOR CONTINUOUS MINING MACHINES

Battery-powered shuttle cars enable continuous mining machines to work 10% more of the shift.

AND...

Two-shift operation is now possible with only one set of batteries.

Independent studies* have proved conclusively that battery-powered shuttle cars cut coal mining costs by nearly one half cent per ton in shuttle car sections. The studies cover fast work as well as operating costs, maintenance, power, labor, supplies, depreciation, and royalties, taxes, etc.

In hand-loaded sections, battery-powered shuttles can save as much as 75 cents per ton and more.

Even more startling evidence of the superiority of battery cars is contained in the results of 95 published case studies made in mines from Pennsylvania to Alaska. Most of these proven facts battery-powered shuttle cars travel 25% faster... discharge 30% faster... do 22% more work... can produce 10% more tonnage!

In other words, battery power is the proven low-cost power for shuttle cars. The bulletin, "A Report of Nine Shuttle Car Operation Based on 95 Published Case Studies," is free on request. Send for your copy TODAY. Address Dept. M-129.

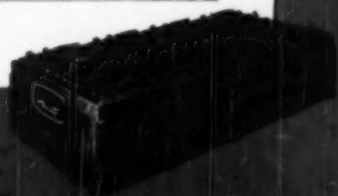
*AIME Technical Publication No. 2198
May, 1957

GOULD

STORAGE BATTERY CORPORATION

VENTNOR 7, NEW JERSEY

Always See Gould Automobile and Truck Batteries



The Gould "unit" with "U" plates. More than 100 years of service.

Available in many mining batteries.



... Cushioned ... Tough ... Flexible ... Mildew-Proof

These are the features that won for Manhattan's Homocord Conveyor Belts a place of honor in the modernization program of the great Clinchfield Coal Corporation. For the past four years Clinchfield has been improving its existing plants and developing new properties. Production capacity has been boosted from 6,500 tons a day to 20,000 tons a day.

Of considerable importance to this increased output is the system of conveyors, underground and above ground. Thousands of feet of Homocord Conveyor Belt help carry coal from seam to preparation plant throughout Clinchfield's extensive operations. One installation is photographed above ... a 48" Homocord Conveyor Belt on a new installation at the Meade Mine.

This was taken before the galleries were enclosed.

RIPPLING MUSCLES CONSTRUCTION

Homocord is the preference of progressive mining men everywhere. Its "Rippling Muscles" construction cushions shock loads and flexes easily and naturally in the troughing idlers. These two factors alone insure longer life for the belt—higher production for the operator. Homocord Strength Members were developed by Manhattan engineers solely for conveyor belt use and cannot be equalled in any other belt.

Be sure you specify "Homocord" in your modernization program and ...

Keep Ahead with Manhattan

COMPLETE LINE FOR MINES

Also used in Clinchfield are Burenik Trolley Wire Guard, Conder Homa-Flex Suction Hose, Conder Homa-Flex Air Hose, Water Hose and other Manhattan products.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY



RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls



3 1/4-yard ESCO coal loading dipper in pit of Sunnyhill Coal Company, New Lexington, Ohio. Shovel is a Northwest 80-D, with 22-ft. 6-in. stick.

for Greater Profit!

Smart operators like Sunnyhill Coal Company are quick to use specialized tools which increase their production. For example, the ESCO coal loading dipper shown above is loading from 30 to 40% more coal than could be done with this machine using standard dippers. Made especially for loading coal, more of the shovel power is used for payload, less for moving the dipper itself.

Useless weight is eliminated.

Flat lip cleans up coal with minimum of dirt.

Long, sharp teeth placed close together to give easy digging, good cleanup.

Built to Last on the Job

In spite of its light weight (the 3 1/4-yard bucket weighs only about 6,700 pounds), ESCO coal loading dippers are tough and durable. They are fabricated of alloy steel plate, with hinges, latching mechanism, teeth and tooth

holders cast of wear and shock resisting manganese and high alloy steel. A solid cast lip is formed by welding web-type tooth holders together.

Detailed Information Upon Request

Let your nearest ESCO representative show you how these fast loading coal dippers will increase your production. Or fill in and mail the coupon. Electric Steel Foundry, 2179 N.W. 25th Avenue, Portland 10, Oregon; 728 Porter Street, Danville, Illinois. Offices in Pottsville, Pa.; Eugene, Oregon; Chicago; Honolulu; Houston; Los Angeles; New York City; San Francisco; Seattle; Spokane. In Canada, ESCO Limited, Vancouver, B.C.

ESCO

Dragline, Dipper, Coal Loading Buckets

 ELECTRIC STEEL FOUNDRY
 2179 N.W. 25th Avenue, Portland 10, Oregon
 Please send additional information on Coal Loading Dippers to:
 Name _____
 Address _____ Zone _____
 City _____ State _____
 Make and model of machines used _____



Continental



NOW STOCKING
THIS OUTSTANDING
UNDERGROUND BELT CONVEYOR

THESE

Superior

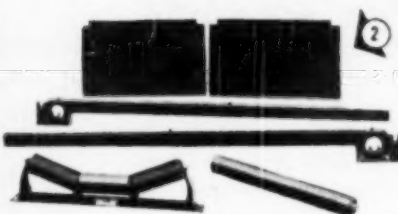
DESIGN FEATURES:



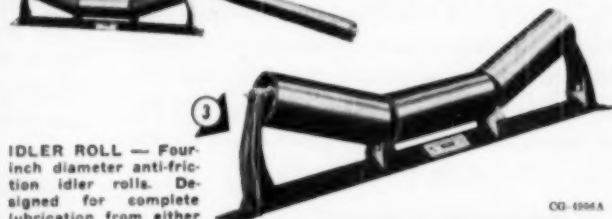
Typical CONTINENTAL underground Belt Conveyor installation.



DRIVE SECTION—Designed for easy dismantling. Available for A.C. or D.C. operation up to 75 H.P. Larger drive units upon request.



INTERMEDIATE SECTION — Designed for easy erection and dismantling, thus requiring a minimum of personnel during moves or extensions. Available in lengths up to 3000 feet.



IDLER ROLL — Four-inch diameter anti-friction idler rolls. Designed for complete lubrication from either side.

CG-4994A

Complete units available in 24", 30", 36" and 42" belt widths.

For other types of Belt Conveyor equipment, see our catalog ID-481

INDUSTRIAL DIVISION
CONTINENTAL GIN COMPANY

BIRMINGHAM, ALABAMA

ENGINEERS



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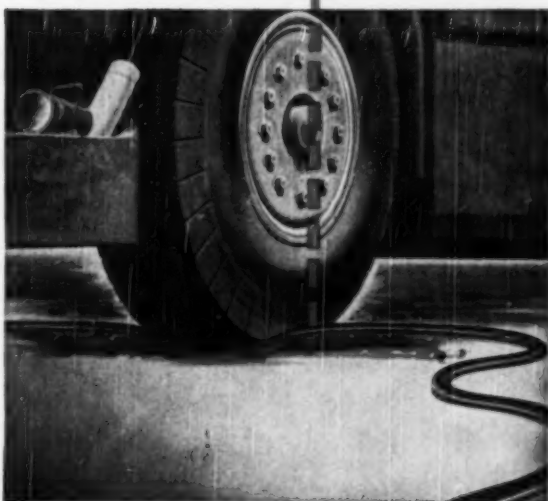
...permits
HEAVIER IMPACT

● Because of its patented Anti-Short Breaker Strip (available with or without ground wire) between conductors, Securityflex Parallel Mine Cable can withstand severe impacts with minimum danger of shorting. Adhesion between jacket and insulation—that makes a *solid block* around conductors—helps to give Securityflex its amazing crush-resistance. (Points that mean *greater safety* and *more tons per cable*.)

Other points of interest in Securityflex . . . neoprene jacket protects against flame, abrasion and tearing . . . engineered construction prevents kinking or twisting and stands up longer under extreme overloads . . . cable meets U. S. Bureau of Mines Flame Test and diameter specifications and Pennsylvania Flame Test.*

Specify Securityflex through your Anaconda distributor (all principal cities). Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Insist on mark of full compliance—P-102-BM—at 12' intervals on any mine cable you buy.



ANACONDA *Securityflex* **MINE CABLE**

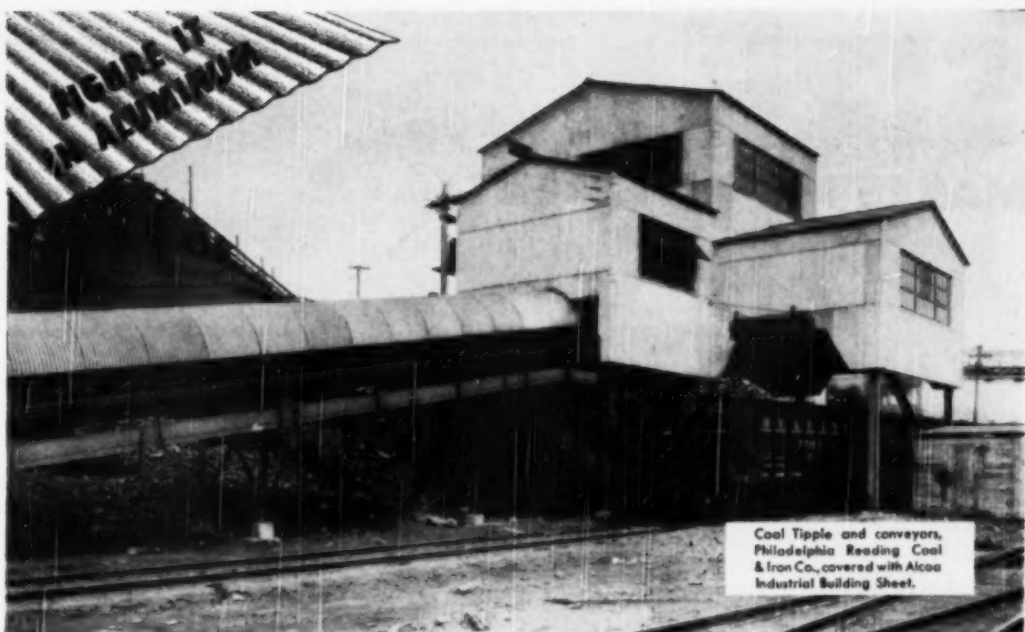


JUST LIKE MONEY IN YOUR POCKET . . .

All that's needed in a shift's cutting operation is a pocketful of Bowdil Throw-away Bits per machine. This ease of handling and changing make Bowdil Bits popular with MACHINE operators . . . long life and coarse cuttings at low cost make them popular with MINE operators. And there's no economy in resharpening bits when you get so many tons per point. Write for complete information on all Bowdil Cost-Cutting Coal Cutting Equipment.



BOWDIL 
COAL CUTTING EQUIPMENT
CANTON OHIO



Coal Tipple and conveyors, Philadelphia Reading Coal & Iron Co., covered with Alcoa Industrial Building Sheet.

TIPPLES ARE TOUGH PROVING GROUNDS

24 Years of Corrosive Coal Dust haven't damaged unpainted Alcoa Industrial Building Sheet

Subjected to weather, wear and coal dust since 1926, the Alcoa Aluminum Industrial Building Sheet covering this tippie and conveyor, still is in excellent condition, still is giving maintenance-free service, never has been painted.

Even under severe conditions you can expect similar service when you build with Alcoa Industrial Building Sheet. Only with aluminum can you get the combination of low first cost, lightness, and ease of erection combined with no painting costs and freedom from rust and corrosion.

Prove this economy yourself. Figure your next plant building in Alcoa Aluminum. For price, engineering and application data call your nearby Alcoa Sales Office, listed under Aluminum in your Classified Telephone Directory, or mail the coupon attached.

FACTS FOR BUILDING OWNERS AND MANAGERS

Low Cost—Alcoa Industrial Building Sheet is low in first cost. Can't rust away. Needs no painting.

Tough, Strong—With 4 foot purlin spacing will support 80 p. s. f. uniform load (safety factor, 2).

Light—100 sq. ft. weigh only 36 lbs.

Available—Prompt delivery from convenient suppliers. All types of fasteners and flashing accessories in stock.

MAIL THIS COUPON TODAY • Get complete details

Aluminum Company of America
1469B Gulf Bldg., Pittsburgh 19, Pa.

Please send me engineering and application data on Alcoa Industrial Building Sheet.

Name

Company

Address

City State

ALCOA

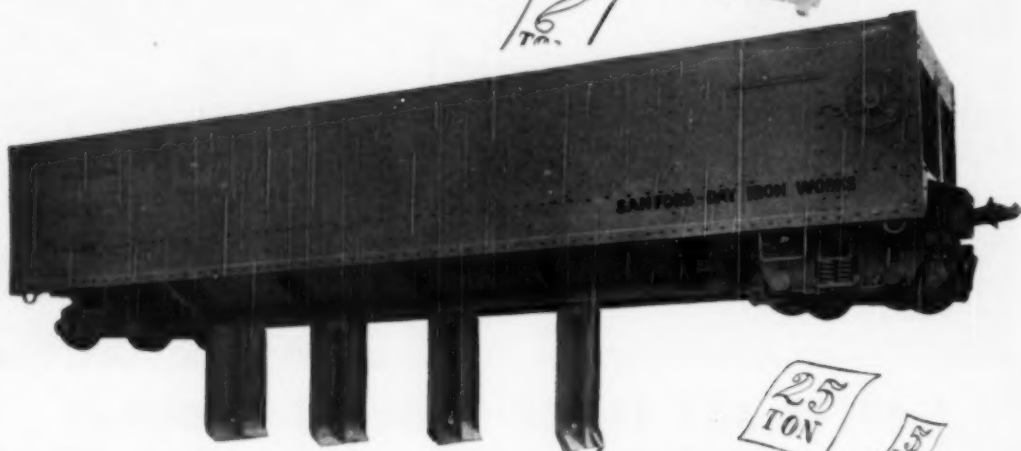
INDUSTRIAL BUILDING SHEET



INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

SIZE

MAKES NO DIFFERENCE...



NOW, ALL S-D 1-2-3 "AUTOMATICS" ARE COMPLETELY SEALED...

Whether it's a $1\frac{1}{2}$ or 30 ton car, all S-D 1-2-3 "Automatics" are now completely sealed against coal dust leakage. Because of a simple "Dust-Roof" seal over space between doors and frame, and with a new patented sealed hood over wheels, coal dust cannot sift down onto tracks with S-D "Automatics." These dust sealed cars save operators thousands of dollars every year in track clean-up costs. **SIZE MAKES NO DIFFERENCE.** For example, the 8-wheel S-D "Automatic" above is 30 ft. long, 8 ft. wide and 6 ft. 2 in. high above rails, and hauls 25 tons of coal. The other car with 12 ft. sides, 6 ft. 4 in. width and 20 in. height, hauls 2 tons of coal. Both are completely sealed.

CONDITIONS MAKE NO DIFFERENCE. All S-D "Automatics" are custom built to meet your requirements. Only fundamentals are the same. Each car automatically discharges its load . . . dumping on the move, and can fill your bin level in case of breakdown beyond the bin. Each car has the exclusive S-D, safe, under-the-car Jerk-out latch mechanism. S-D "Automatics" lead a comparatively easy life and repairs are seldom required because they are not subjected to the damaging strains of being lifted or turned over for dumping. For more actual dollar returns on the investment, S-D "Sealed Automatics" are, by far, your best buy!

Sanford-Day Iron Works
KNOXVILLE TENNESSEE

PARIS MANUFACTURING COMPANY

Announces

THREE NEW DRILLS

The PARMANCO Coal Drill will drill 2½ inch holes at a speed of up to six feet per minute in #5 coal. Equipped with heavy duty truck-type transmission and rear end and a complete hydraulic feed, the drill is operated by one man from the control seat. It is made in two sizes with a 12 h.p. or 25 h.p. gas motor and all units are completely self-contained and enclosed in oil-tight cases.

ALREADY USED by

United Electric Coal Companies	1	Enos Coal Mining Co.	1
Ayrshire Collieries Corp.	2	Hustville Simlar Mining Co.	4
Big Bend Collieries, Inc.	1	Trust-Trax Coal Company	1
Little Sister Coal Corp.	1		

**THIS UNIT IS DELIVERING 6-INCH SHOT
HOLES — READY FOR LOADING
at Better Than a Foot a Minute !!!**

The new PARMANCO Hi-Speed Horizontal Drill is completely redesigned around a 40 h.p. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time — a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.

PARIS
MANUFACTURING
COMPANY
Paris, Illinois

SAFETY STRESSED IN DESIGN OF COLMOL



Here is where the Operator is stationed—well back from the face. From this position he is able to maneuver the big machine at will. This unit has a variable speed from 0' to 25' per minute.

Patent
Pending

OPERATOR POSITIONED 20 FEET FROM THE FACE—NO SHOOTING

Safety is just one of the many features of the COLMOL—we expect to introduce others from time to time.

- High Production
- Ruggedness
- Economy of Operation
- Clean-Up
- Timbering
- Continuity of Operation
- Enlarged Applications
- Maneuverability

Hazard to the Operator of the COLMOL is greatly reduced—he is located approximately 20 feet from the face where the cutting takes place. This positioning also eliminates the hazard of swinging booms.

Besides, no shooting is required with the COLMOL—it just bores into the face and starts digging. It produces a run-of-mine coal with a minimum of fines—greatly reducing the dust hazard. This continuous one-process machine permits mining with reasonable safety under roof conditions unsafe with conventional methods.

The low-type COLMOL is shown. Note the two breaker heads with 10 breaker arms on top and 5 on the bottom, providing a cutting width of 9'6" into seams from 30" and up. Conveyor is 42" wide and will raise to maximum height of 50", allowing 38" clearance for Shuttle Car.

**COLMOL is engineered
manufactured
sold and serviced
by**

Additional data on this low-type machine as well as Intermediate model will be sent upon request.

THE JEFFREY MANUFACTURING COMPANY

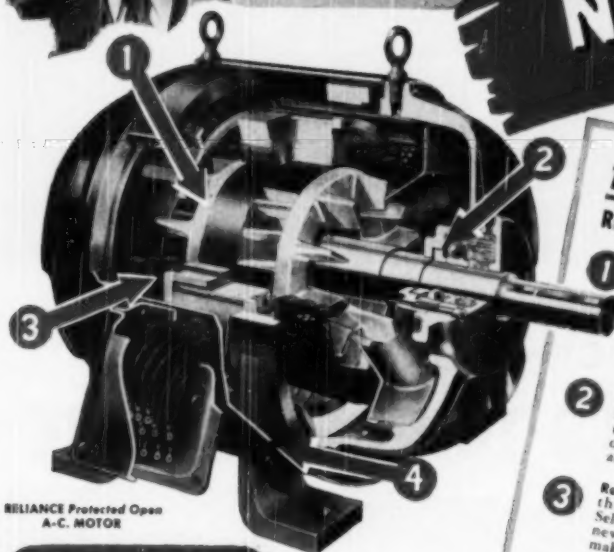
912 North Fourth Street

Columbus 16, Ohio



WHY HASN'T
SOMEBODY TOLD ME
THIS BEFORE?

"...all motors are
NOT ALIKE"



RELIANCE Protected Open
A-C. MOTOR

RELIANCE
Precision-Built
MOTORS

...are made **better** to deliver
DEPENDABLE POWER—LONGER!

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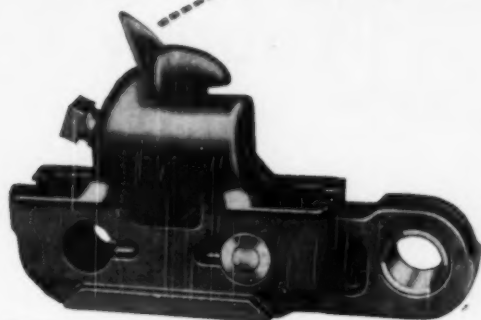
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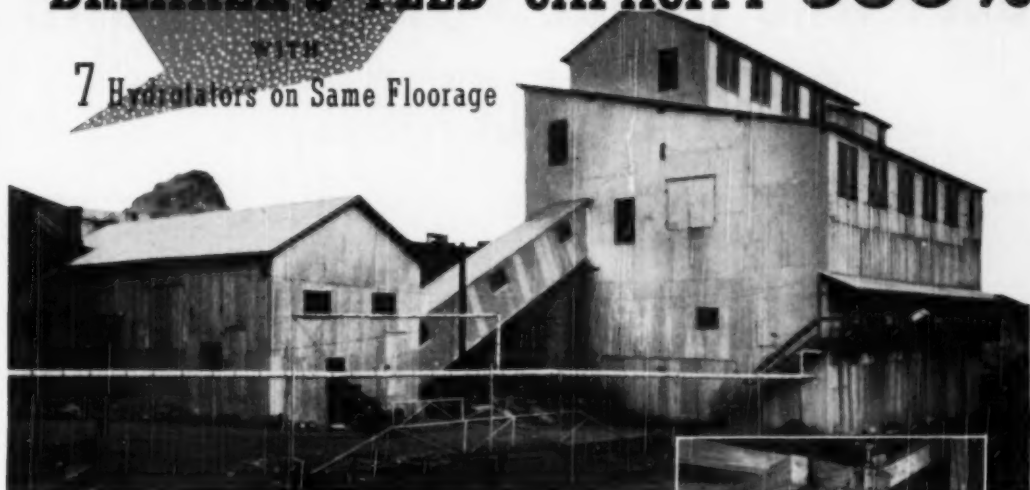
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Pictured here are 2 of the 7 Wilmot Hydrotators installed in the Capone Coal Co. plant. Above, for preparing Nut; left, for Pea.

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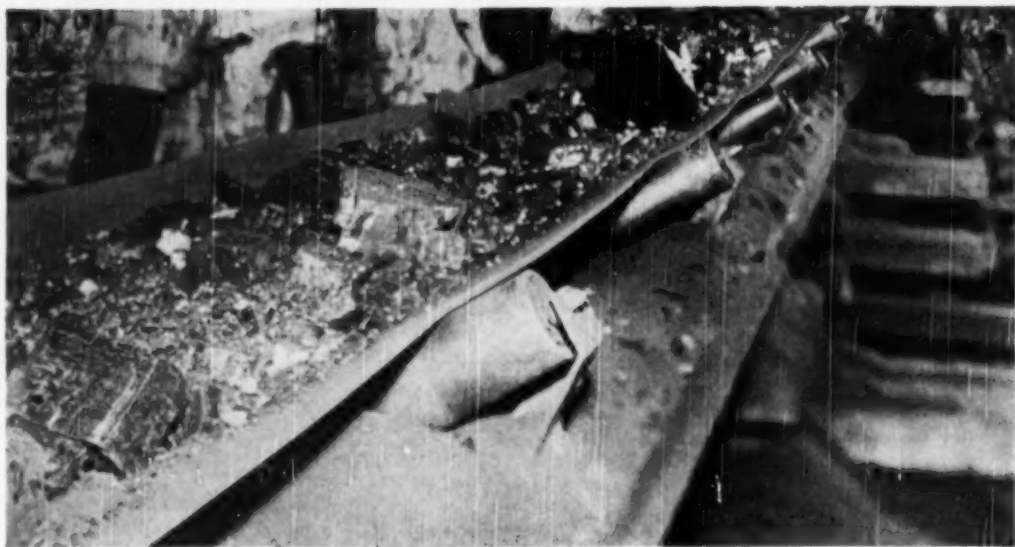
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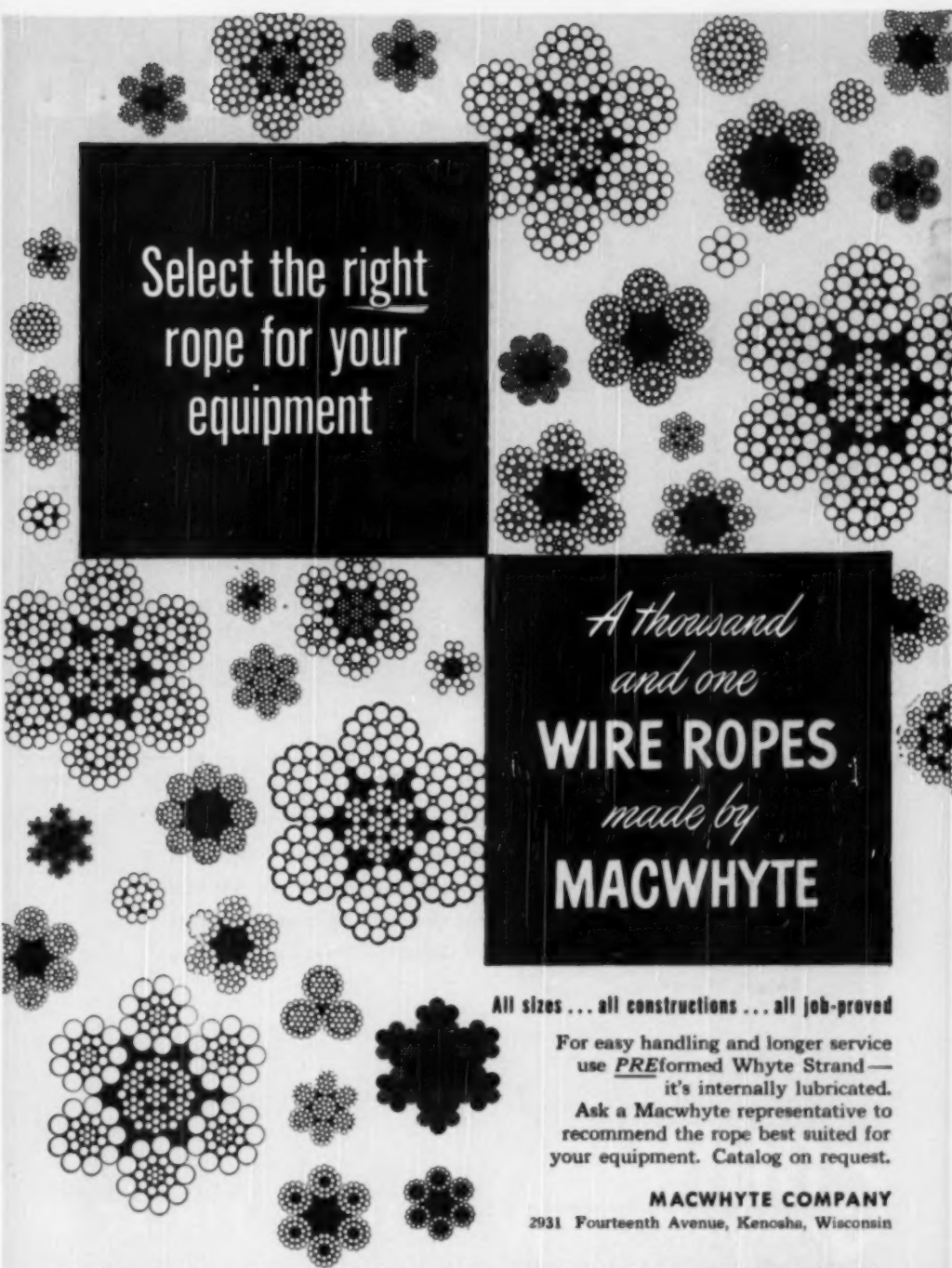
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FEBRUARY, 1950

IVAN A. GIVEN, EDITOR

Dead End—or New Start?

ON THE SURFACE, the course of events in 1949 was scarcely one to reassure anthracite and bituminous coal producers, let alone consumers. About the time the progress train was getting up speed, it was unceremoniously and arbitrarily flagged by John L. Lewis, thereafter standing with the block against it or proceeding under Lewis-imposed slow orders. In more-conventional terms, the bright promise of New Year 1949 was dissipated in confusion, frustration and market reaction continuing into 1950, with no definite promise of a return to normal at the time of this writing.

But, has coal come to a dead end against the Lewis monopoly? Optimism comes hard with production strangled and no sign as to whether relief is near, far in the future, or never to be expected. Still, is there overpowering reason to write off immediate and future expectations and revert to a rearguard action aimed only at postponing collapse as long as possible? Examined in that light, the answer remains a definite "No"! Real progress on many fronts in 1949, though obscured by the impact of work stoppages, production limitations and resultant disruptions of normal consumer relations, alone would warrant that answer, aside from the trend in energy use in the United States and the confident expectation that the Nation, not to mention the coal miners themselves, will stand for just so much and no more.

Consider a few facts. First, there is no substitute for coke in the smelting of pig iron. Second, there is still a hard core of preference for coal for many applications. The utility industry, for example, will use coal if at all possible unless there is further severe distortion of present relationships with other fuels. Third, the growth in energy use, while it also will bring along other fuels, inevitably must exert power-

ful pressure for the expansion of coal consumption. Fourth, coal constitutes far and away the largest energy reserve of the United States, and where there is a large reserve the tendency is to make use of it in spite of powerful pressures to the contrary. The key is a stable supply, of maximum quality, at reasonable prices. If that goal can be reached, the promise of a bright future for coal will almost automatically become a reality.

To repeat, in spite of the confusion and frustration of 1949, coal made substantial progress along at least some of the roads to a better future. Actual production at a rate of 200 tons per man-shift with one new machine, though specialized in nature, indicated beyond doubt that the new equipment now being designed or produced, if enabled to operate as it should, can put coal in an impregnable position costwise. Preparation advances, better marketing, intensified public relations and research—though still on a scale not commensurate with the job—are smoothing the way to better public and consumer acceptance.

The big unsolved problem is attaining a state of union and employee relations that will assure uninterrupted production and an opportunity to achieve maximum progress in all the other directions affecting public and consumer goodwill. The answer is no easy one, in view of the legislative grant of monopoly power to union leaders, but the operators have made a real beginning by standing firm for a settlement that will assure uninterrupted and unlimited output and a chance to press forward toward the goal of better service. There is good reason to believe that a satisfactory solution to coal's No. 1 problem is not too far off and that as a result, in spite of temporary difficulties, 1949 and 1950 will mark not a dead end but a new start.



Photos: Wide World

MR. LEWIS—"You need the men and I have all the men, and they are here in the palm of my hand. And now I ask, 'What am I bid?'"

1949—Troubled Year

Operators and Miners Barred From Opportunities As Oil and Gas Fill Energy-Need Gap—Public Opinion Cushions Union Tactics — Operators Find Strength in Unity — Research and Training Gain—1950 Outlook Good

1949 COULD HAVE BEEN a good year for coal. Energy demand fell off only a little from the high level of 1948 and national income dropped only slightly. Generally, light and heavy industry stayed active and business throughout the country was pretty good—far bet-



CAUGHT IN THE MIDDLE—In 1949, miners lost over 70 days' work and more than \$1,200 in wages, besides a complete shut-off of benefits from their welfare fund. At the end of the year, they had no gains to offset their losses.



MR. MOODY—"Our proposals have been given little consideration and there has never been the slightest intimation that any of them would be accepted by the union."



MR. LOVE—"An enlightened union should be working with management toward increasing rather than decreasing the amount of work available for its members."

ter than in the best prewar years.

If, like other industries, coal had been permitted to stay at work, mine owners, mine management and miners would have been well off. But Mr. Lewis shaped the year to his own willful pattern. The upshot was that idle mines and idle miners, three-day weeks and no-day weeks barred the industry and its people from the opportunities the year promised at its start.

Output and Earnings

Bituminous production dropped over 27% from 599,518,229 tons in 1948 to an estimated 435,000,000 tons in 1949; anthracite, 24% from 57,139,948 to 43,019,000 tons. Strip mines accounted for about 21.5% of bituminous output in 1949 against 23.3% in 1948; anthracite, approximately 24.5% against 23.8% in 1949.

Harassments and discouragements throughout the year—mostly Mr. Lewis' strategy—dampened the enthusiasm with which coal operators started the year, with the result that plans to expand operations and capacity reached the lowest point since 1944. Coal companies opened or placed in development only about 25 deep mines of significant size, with total daily capacity estimated at 66,000 tons, and about 15 strip mines with capacity of 19,650 tons per day. A good deal of this expansion was carried over from plans laid down in 1948 or

was replacement of worked-out mines. After August, announcements of new developments fell off sharply.

On the whole, coal-company earnings were well below 1948 levels. The loss grew mostly out of three-day-a-week operations and complete shutdowns, which more than offset savings made possible by new and new-type machines and equipment and by some improvement in the tons-per-man-day figure, which rose

from 6.50 to 7.0 in bituminous. In anthracite, tons-per-man-day held steady at about 2.81.

Showing what happened to company earnings, one big bituminous company, for example, reported that in the nine months ended Oct. 31, 1949, net income was only \$111,403 against \$2,282,588 in the same period, 1948. A large anthracite company reported a deficit of \$1,455,372 in the nine months ended Sept. 30, 1949, against a net profit

Coal and Competition—1948-1949

	1948	1949	Percent Change
Anthracite, tons	57,139,948	43,019,000	-24.7
Bituminous, tons	599,518,229	435,000,000	-27.4
Crude oil, bbl.	2,016,282,000	1,845,000,000	-8.5
Sales and shipments:			
Natural gas, Mcf.	2,822,039,300	3,153,335,000	+11.7
Mfg. and mixed gas, Mcf.	590,256,000	555,657,000	-5.8
Stokers, Classes I and II	76,528	28,000	-63.4
Residential, residential-boiler and residential-furnace oil-burner units.	392,864	542,000	+12.5
Railroad fuel:			
Coal, tons	102,190,437	70,400,000	-31.1
Liquid fuel, bbl.	119,571,128	100,000,000	-16.4
Electric-utility fuel:			
Coal, tons	99,586,341	84,342,000	-15.3
Oil, bbl.	42,644,869	64,400,000	+46.2
Gas, Mcf.	478,097,093	551,931,000	+15.4

Figures for 1949 preliminary or estimates. Sources: U. S. Bureau of Mines, American Gas Association, Department of Commerce, Interstate Commerce Commission and Federal Power Commission.

Coal's Troubled Year Helps Oil and Gas Gain New Fuel Markets

of \$1,010,433 in the same period, 1948. In short, curtailed work weeks and struck mines cut profits to a point where, unless profits could be improved in the years ahead, the industry's future would be jeopardized.

Competing Fuels

Competition-wise, coal had a tough year, with oil and natural gas gaining strength and liquefied petroleum gas beginning to take on the stature of a major contender. Total petroleum output, to be sure, was down about 8% from 1948, largely because of a warm winter and spring, 1948-49, and a warm start for the 1949-50 heating season. However, oil captured a big share of the new-home and conversion market, as reflected in a 12.5% increase in residential oil-burner sales. Sales of domestic stokers meanwhile declined 63.4% to an estimated 28,000 units.

On the natural-gas side, sales increased from 2,822,039,300 Mcf in 1948 to an estimated 3,153,335,000 Mcf in 1949. Much of this growth was marked up in homes and small commercial establishments, with the number of residential customers increasing from 10,894,200 in 1948 to approximately 12,198,000 in 1949; commercial customers, from 827,700 to about 1,060,000. LPG, some 70% of which is used in homes, boosted sales from 2,600,000,000 gal in 1948 to some 3,000,000,000 in 1949, while customers increased to over 400,000.

Coal's competitors also took over a good share of industrial markets in 1949. The downward trend in railroad freight and passenger traffic, to be sure, accounted for some of coal's losses. Yet the fact remains that where liquid-fuel use by railroads dropped 16.4% from 119,571,128 bbl in 1948 to about 100,000,000 bbl in 1949, coal use was off 31.1%, dropping from 102,190,437 to an estimated 70,400,000 tons. Naturally, the railroads' switch to diesel-electric power played a major role in the changing picture. Of the 1,742 new locomotives put into service on the first 11 months of 1949, 1,687 were diesels and 55 were steamers.

In the power-generation field, oil use by electric utilities increased 46.2% from 42,644,869 bbl in 1948 to approximately 64,400,000 bbl in 1949. Natural-gas consumption was up 15.4% from 478,097,093 to 551,931,000 Mcf. Meanwhile, coal use fell 15.3% from 99,586,341 to some 84,342,000 tons.

The fact that the utilities' stocks of coal held pretty steady at 120-130 days throughout the three-day weeks and the complete stoppages, while their use of oil and gas mounted sharply, was mute evidence of the utilities' ability to switch to other fuels if their supply of coal was threatened. It was evidence also that as far as price is concerned, coal now holds little advantage over competing fuels.

Natural-gas pipeline growth continued at a fast pace in 1949. In the first six months of the year, the Federal Power Commission authorized construction of 4,900 mi of lines, most of them reaching into major coal-market areas—the upper Midwest, the Atlantic Seaboard and New England. Total cost of these new lines was estimated at \$375,000,000; total daily capacity, 2,000,000 Mcf, equal to about 83,000 tons of 13,000-Btu coal. In August, natural gas reached the New York City area for the first time.

Pending completion of a new 1,800-mi line from Texas to New York, Transcontinental Pipe Line Corp. sought permission to boost capacity from 340,000 to 505,000 Mcf daily to Philadelphia, Newark and New York. And, by the end of the year, at least four pipeline companies were planning to introduce natural gas to homes and industries in New England. Efforts of coal and related interests to bar the use of natural gas by atomic-energy plants at Oak Ridge, Tenn., were fruitless and AEC officials went ahead with their plans to build a pipeline delivering 60,000 to 80,000 Mcf per day in a region abounding in coal.

Some firming up of the FPC's attitude on new pipelines was indicated when, earlier in the year, authorization was refused to one company seeking to pipe gas to New England on the grounds that sources of supply as shown in the petition were inadequate and uncertain. But in December, when the company renewed its request and showed dependable and adequate sources of supply, the FPC acted favorably.

Labor Relations

On the labor-relations front, frustrations and disappointments on all sides ran throughout most of the year. Warm weather, a slight decline in energy demand and a new-found unity among operators combined to weaken Mr. Lewis' drive for more pay, shorter hours and a bigger tax for the welfare

fund. He came up to the end of the year with no gains for his miners—in fact, there were some rumblings of discontent among rank-and-file union members, many of whom had been idle for over 70 days and on a three-day week for much of the time.

Miners lost at least \$1,200 each in pay and, besides, had to accept a halt in pension, disability and other payments from the welfare fund. Evidence of miner discontent over depletion of the welfare fund came to light in two legal suits, one entered by a Pennsylvanian who asked for an accounting of the fund's operations and another by a Kentuckian, who alleged that the union had ignored his pension claim.

Wage-Talk Blocks

Mr. Lewis' harassments, delays and smoke screens kept operators on the edge of their chairs throughout 1949, tried their patience to the snapping point and drove coal customers to other fuels. Mr. Lewis called out his miners for two weeks, Mar. 14-28, in a so-called "memorial" stoppage to protest Senate confirmation of Dr. James Boyd as director, U. S. Bureau of Mines, and to dramatize the union's support of the federal mine-inspection bill; for a week, June 13-20, in a "brief stabilizing period of inaction"; and again for 52 days, Sept. 19-Nov. 9, in a "no welfare-no work" strike following suspension of welfare-fund payments Sept. 17 in bituminous and Sept. 30 in anthracite. From July 5 to Sept. 19 and again following Dec. 5, he decreed a three-day work week.

Though the stoppages and slowdowns did not affect all operators alike, anthracite miners and bituminous miners west of the Mississippi being permitted to work a little more regularly than their brothers, the fact remained that for 10 months of the year no coal company knew where it stood from one week to the next. The year ended with bituminous negotiations completely stalled, except for a few small operators who knuckled under to Mr. Lewis' demands for a 95c-per-day wage boost and a 35c-per-ton payment to the welfare fund. Anthracite negotiations were under way as the new year came in but no progress was reported.

Compounding the injury of the off-again-on-again work schedule, Mr. Lewis conducted wage talks in such a way as to make agreement impossible. He refused to accept

the tonnage claims of the Southern Coal Producers' Association when negotiations opened May 25, kept all groups in the dark as to the scope of his demands until October, blamed operators for the depletion and shutdown of the welfare fund, needlessly attacked the motives and methods of at least two individual operators, refused to accept Ezra Van Horn's resignation as a welfare-fund trustee and blocked the seating of former Judge Charles I. Dawson as the operators' new trustee. In short, his tactics were calculated to confuse, distract and frustrate, and, to put it mildly, did nothing to promote public goodwill or foster understanding between miners and management.

Welfare Fund

Naturally, the welfare fund played a major role on the labor-relations scene. Enlarging operations that already were called lavish in some quarters, Mr. Lewis announced January 9 that a costly health, hospital and medical program was set to go, with services organized in 10 geographical districts covering major mining areas.

In April, with Senator Bridges, neutral trustee, concurring and Mr. Van Horn dissenting, Mr. Lewis lowered the pensionable age of miners from 62 to 60 years. In August, the fund announced expenditures of \$104,880,785 in the year ended June 30. In September, with the fund nearly bankrupt, the trustees voted to suspend all but emergency payments. Mr. Lewis alleged that the shut-off was forced by default of payments by some southern operators, ignoring the fact that expenditures had exceeded income for some months past and that strikes and three-day weeks decreed by the union had reduced income to the fund.

Later, the fund took the center of the stage again when, in September, Mr. Van Horn submitted his resignation and the operators named Judge Dawson to succeed him. Refusing to accept Mr. Van Horn's resignation and denying Judge Dawson his seat, Mr. Lewis placed Miss Josephine Roche, fund administrator, in the "neutral" seat and H. W. Showalter, president, Monongahela Rail & River Coal Corp., Fairmont, W. Va., in the operator-trustee seat. This arrangement was reported to be effective in the few contracts that Mr. Lewis had signed with small operators as the year drew to a close.

In addition to industry-wide

stoppages and slowdowns, there were scattered disturbances in local areas. In January, some West Virginia deep mines were closed for a while in a dispute over mine and section foremen acting as fire-bosses. Later, as Mr. Lewis called strikes and ordered the three-day week, non-union mines in western Kentucky, Alabama, West Virginia and Virginia were shut down by flying squadrons of UMWA pickets, who overturned trucks, blasted tipples and railroad bridges and roughed up miners who wanted to work. In western Kentucky, non-union mines obtained some help from the courts. In Virginia, Governor Tuck took steps to assure continued operation of mines supplying coal to homes and essential services. And in Alabama, several union members were prosecuted for assault and violence and were convicted.

In federal and state courts and in hearings before the National Labor Relations Board, Mr. Lewis and the UMWA suffered some reverses. In January, a NLRB trial examiner ruled the union-shop clause in the 1948 "captive" contract void and told miners to stop acting as if it were legal. In March, the NLRB in Illinois barred the UMWA from an employee-election ballot because Mr. Lewis had refused to sign the anti-Communist affidavit required by the Taft-Hartley Act. In Arkansas, the union's suit to collect welfare-fund levies was denied because Arkansas law forbids a closed shop. Finally, in December, the U. S. Supreme Court upheld the \$1,420,000 contempt-of-court fine imposed on the UMWA and Mr. Lewis by Judge Goldsborough in 1948, and the union had to pay up.

Training Gains

However, though industry-wide relations with the union deteriorated, management and miners got along pretty well on the local level. Because of reduced revenues, a few companies were forced to cut back their expenditures for employee magazines, picnics and other costly goodwill activities. But the cut-backs were by no means general and most companies maintained the worker-relations budgets of more prosperous years. For example, there was no apparent let-up in company-, county- and area-wide safety meets, often accompanied by beauty contests, big feeds and brass bands. They took place in nearly every state where coal is mined.

Companies also sustained their

first-aid and safety training programs among miners and, in some instances, miners' families. In January, for example, Consolidation Coal Co. (Ky.) announced that 100% of the employees at three mines had finished the Bureau of Mines first-aid course. This was followed in April, to mention only one more example, by the announcement of Majestic Collieries, Majestic, W. Va., that all 711 workers had been trained in first aid, making it the fifth large operation in the Tug River-Pond Creek district to go 100%.

To show that management also is in the safety act, Hillman Coal & Coke Co., Pittsburgh, Pa., sent its mine officials through the Bureau safety course. These programs and others were aided and abetted by the Safety Division, National Coal Association, which, following its organization in 1948, moved into high gear in 1949.

Elsewhere on the training front, coal companies in Illinois, Kentucky, Tennessee, West Virginia, Ohio, Pennsylvania and other states continued to provide college scholarships for sons and daughters of employees and for young men intending to take up coal mining as a career. At St. Francis College, Loretto, Pa., 27 miners from central Pennsylvania fields completed their last hitch in a three-summer course in mining and other subjects, a good share of their expenses being paid by their companies. At Portage, Pa., 58 high-school boys enrolled in courses in coal mining, with regular talks by coal executives and mining officials rounding out classroom studies.

In other towns in Pennsylvania, Ohio, West Virginia and Kentucky, similar high-school courses of several years' standing continued, with enrollment holding steady or gaining. In Colorado in June, five graduates finished a new course in coal-mining engineering, a new curriculum recently started at Colorado School of Mines. Much of this aroused interest in training for coal mining was the work of the Vocational Training and Educational Committee, NCA.

Government Relations

In the government-relations area, coal fared pretty well—at least as far as meddling and interference were concerned. Except for the well-intentioned but fruitless efforts of Cyrus Ching, federal mediation chief, to bring about a meeting in November between Mr. Lewis and

Strong Fuel Demand and Coal Progress Improve 1950 Outlook

bituminous operators, the administration stayed out of the wage dispute.

In fact, the President's reluctance to take a hand in events gave some operators and most coal retailers real concern. Though experience had taught them bitter lessons about the heavy hand of government, some operators despaired of reaching a reasonable agreement with the union and, alarmed by shrinking stockpiles at the end of the year, at last looked toward the government, the Taft-Hartley Act and the NLRB for action.

Earlier in the year, in July, the Robertson subcommittee of the Senate Committee on Banking and Currency, provoked by the tactics of Mr. Lewis and other labor leaders and spurred by talk among some coal operators of naming an industry coordinator to guide coal's relations with the union, opened hearings on union monopoly powers. Though the sessions were suspended in August until after the first of the new year, it was generally felt that the coal operators had stated their case effectively.

The controversial federal mine-inspection bill, backed by the union and the Bureau of Mines, also brought coal operators onto the Congressional stage, this time to oppose vesting federal mine inspectors with power to enforce a uniform safety code and close down mines where their recommendations were not followed. When Congress adjourned in October, the bill was held over for consideration at the session beginning Jan. 3, 1950.

In August, the U. S. Bureau of Mines announced two steps to improve efficiency and enlarge its operations: (1) reorganization on a regional basis, with nine semi-autonomous regional offices, and (2) establishment of a roof-control unit within the Health & Safety Branch.

Freight Rates, Local Laws

Elsewhere on the government front, coal was saddled with increased freight rates when the Interstate Commerce Commission in January granted the railroads a temporary boost averaging 5.2%. Later, in August, an additional 4% was tacked on. These increases, though doubtless of some temporary help to the railroads, handicapped coal still further in competition with other fuels and brought the railroads hard up against the law of diminishing returns. In fact, high freight costs spurred one big

coal user to propose a 103-mi belt conveyor to haul coal and ore between the Ohio River, at a point near East Liverpool, Ohio, and Lorain, on Lake Erie. Savings of some \$20,000,000 to \$45,000,000 per year in freight charges were envisioned. Though the Ohio legislature failed to pass a bill granting the right of eminent domain for the project, the issue still was very much alive at the end of the year, with the possibility that the legislature will undertake further hearings at its next session.

Coal's relations with state governments were marked by a spate of tax, safety, land-restoration and other proposals. In Illinois, for example, new taxes and new strip-land laws were proposed in February. In March, state legislatures weighed proposals for new taxes in West Virginia and Pennsylvania; safety bills in West Virginia, Pennsylvania and Maryland; revised mining codes in Colorado and Arkansas; and strip-land reclamation in Indiana, Montana and Ohio.

In most instances where the industry would be penalized without comparable gains to the state and its people, coal operators successfully fought off the proposed measures. In Pennsylvania, in fact, a court decision in January voided a Hazle Township tax of \$1.50 per horsepower on shovels and other strip-pit equipment. Later, the legislature banned school-district taxes on coal and other natural resources effective July 1, 1949, and rescinded certain borough and township taxes on coal after Jan. 1, 1950.

Public Relations

In public relations, coal's contract-bargaining drama with accompanying strikes and slowdowns canceled out some of the progress marked up in previous years. Several factors, however, kept the damage at a minimum. In this holding action, Bituminous Coal Institute led the field. To mention only a few of that organization's activities, it distributed over half a million copies of "Old King Coal Calls a New Tune," a like number of picture books called "A Down-to-Earth Picture of Coal," 25,000 copies of "Pertinent Facts About Coal," and a large number of copies of "Coal Facts Annual—1949." In addition, nearly a million teaching aids were sent to schools and teachers in response to requests for information about coal.

BCI also continued its radio-news

broadcast, "Congress Today," and its series of informative advertisements in popular and industrial magazines; exhibited information materials at industrial shows and professional meetings throughout the country; and gave increasing circulation to two films on coal mining, "The Magic of Coal" and "Underground Adventure." In the 1948-49 season, BCI's Speakers' Bureau reported a total of 320 public speeches about coal before civic, trade and professional groups in many parts of the country.

Coal Heating Service proved to be a growing tool for bituminous in the public-relations field. By October, CHS had grown to 73 groups, enrolling 1,900 retailers in 300 cities and towns in 24 states and representing annual sales of 17,500,000 tons. Through CHS, the industry—producers and retailers alike—was getting about \$625,000 worth of advertising annually to boost coal as a home fuel and win goodwill through better service to customers.

Taking on its share of public-relations work for coal, the Anthracite Institute meanwhile published and distributed a booklet on "How to Get More Heat for Less Money," stepped up the pace of its advertising campaign to tell the merits of anthracite and to urge summer fill-ups, and joined with other representatives of the industry in urging passage of a Pennsylvania law requiring a quality label on all anthracite shipments to market. Producers continued their distribution of merchandising aids and public-relations helps to retailers and, together with certain equipment manufacturers, provided a course in automatic heating for their dealers.

Smoke Abatement

To solve a vexing public-relations problem, the Coal Producers' Committee for Smoke Abatement, the NCA Committee on Air Purification and other groups kept up their efforts, with increasing success, to improve fuel-burning methods and to bring reason to bear on smoke problems, particularly in framing city smoke ordinances. BCI joined the movement with publication of "What's in the Air," a small factual booklet on air pollution. In Pennsylvania, BCR joined with Allegheny County railroads in October in a drive to cut railroad smoke in the Pittsburgh area. In December, the Pennsylvania Department of Health set up a program to study

air pollution, providing a mobile laboratory for on-the-spot investigations. In New York City in November, the Anthracite Institute organized a clinic to help officials solve the city's smoke problem.

Attracting Youngsters

To create goodwill for the years ahead, several coal companies aimed part of their public-relations program at high-school youngsters and their principals and teachers. To mention only three, Consolidation Coal Co. (Ky.) in April invited 150 boys from Floyd, Letcher, Pike and Johnson counties to visit Mine 204; later, a group of high-school seniors, boys and girls, toured mines of Sahara Coal Co., in Illinois; and, in November, The Hudson Coal Co., Scranton, Pa., was host to a group of boys and girls from the New York City area. To draw the interest of high-school principals, Illinois operators and the University of Illinois joined in sponsoring a week-long summer course to show the opportunities in coal mining to men who often guide students' choice of a career.

Research Progress

Research also proved to be a strong public-relations asset in 1949, with announcements of completed projects and projects under way showing that the industry is progressive and alert to opportunities. For example, early in the summer, BCR issued a booklet called "How to Cut Boiler-Plant Costs by Mechanical Coal and Ash Handling," the outgrowth of considerable study and development by BCR engineers and others.

At midsummer, the Small Homes Council, University of Illinois, published "Homes Planned for Coal or Coke," a booklet showing that coal-heated homes can be as comfortable, clean and convenient as homes heated by other fuels. In the fall, BCR announced the successful use of fly ash as an admixture for concrete and in such specific items as cinder blocks, bricks, asphalt, bitumastic road construction and insulating cement. In March, the "Fire Chief" automatic boiler-burner was placed on the market in two sizes, the product of extended research and development by the Anthracite Institute.

Elsewhere on the research front, BCR's Locomotive Development Committee in November ran a successful 40-hr test on a combustor to be used in the coal-burning gas-

turbine locomotive, which has been under development for over three years. With coal-handling and crushing systems near completion and with the first of two specially-built turbines delivered early in December, officials predicted that the first locomotive of this type would be road-tested before the end of 1950.

Earlier, in October, BCR's Mining Development Committee reported that a stainless-steel belt conveyor had proved its worth in underground tests, promising high efficiency and low cost. In addition, the committee displayed the first lump of coal cut directly off the solid by a machine embodying the design principle of a new-type continuous miner for seams as thin as 28 in. At the end of the year, work was continuing on these and related projects, including a flexible conveyor to speed underground transportation at the face.

BCR meanwhile sped its studies on railroad-fuel problems, including cinder emission, smoke and air distribution; home-heating equipment and, in partnership with the Small Homes Council and other agencies, home design; industrial coal-burning equipment; and gasification. The Anthracite Institute continued its search for wider industrial markets, including power plants, tobacco-curing barns and foundry cupolas; improved beneficiation, including gasification and pelletizing; and better home-heating equipment for more comfort and convenience.

In Wyoming, progress was reported in a joint state-and-industry project to find better ways of briquetting low-rank western coals. In Missouri, Sinclair Coal Co. and the Missouri School of Mines began a new approach to underground gasification, using an electric current to fire the coal seam. In Alabama in March, the U. S. Bureau of Mines and Alabama Power Co. fired a second seam of coal, of larger acreage and under deeper cover than in 1948, in their joint underground gasification experiment. Near Pittsburgh, Pa., in April, the Disco plant of Pittsburgh Consolidation Coal Co. started commercial production of a new smokeless fuel, part of that company's wide program to improve coal utilization and beneficiation and thus widen coal's markets.

Oil From Coal

In the synthetic-liquid-fuels program, the Bureau of Mines made headlines with the dedication of

hydrogenation and gas-synthesis demonstration plants at Louisiana, Mo., May 8. The Bureau announced that new processes and better equipment give promise of further cost cuts in coal-to-oil plants.

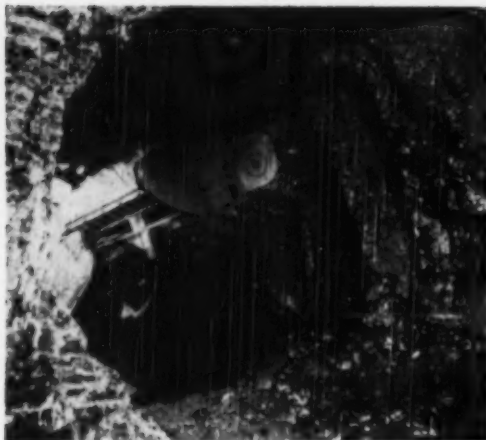
Meanwhile, industrial groups in Colorado and Tennessee urged that coal-to-oil plants be located in those states and the Army Corps of Engineers got under way with a long-range survey of coal and other resources to determine areas suitable for building synthetic-liquid-fuel plants. Earlier, in February, Secretary of the Interior Krug had urged federal loans to private industry to build plants for making oil from coal and oil shale.

Outlook for 1950

Adding it all up—the year's promises and disappointments, the industry's achievements and troubles—1949 was not altogether lost, though it was far from what it might have been. Out of the upheavals and gloom there grew a strong unity among operators. Mr. Lewis found no substantial crack in their solid front but rather a determination to resist his dictation and to keep coal prices within reason. Strong leadership, newly emerged among the operators, was a big factor in their unity. Though the going was tough in the first year of this new-found strength, the chances were good that the years ahead might be easier because the operators stuck together in 1949.

The year 1950 should be much better, Mr. Lewis permitting. Important research developments are due to be unveiled before the year ends—advances that will cut mining costs, reopen the railroad-fuel market and provide better burning equipment for coal's customers. Counting industrial and domestic needs and replacement of stocks, bituminous consumption should run close to 550,000,000 tons. Demand for anthracite probably will be around 50,000,000 tons, assuming anything like a normally cold heating season. By most standards, these figures would make 1950 a pretty good year.

If he wants to, of course, Mr. Lewis can put the industry through the wringer again in 1950, as he did in 1949. But if he permits his miners to stay on the job and the industry to cash in on its opportunities, workers, mine management and mine owners will share good times again. He is the big question mark in 1950.



MINING-AND-LOADING MACHINES, including a new low-type unit, paced deep-mining progress in 1949. Other major developments included cutting and loading without shooting and actual or projected mining with auger equipment.

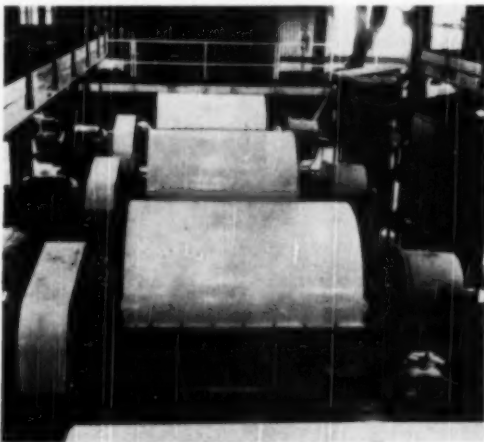
Coal Expands Machine Use

Efficiency Rise Reflects Growing Use of Mining-and-Loading Machines, High-Capacity Stripping Equipment and Auger Units—Roof Bolting Promotes Safety—Fine-Coal Treatment and Drying Stressed in Preparation

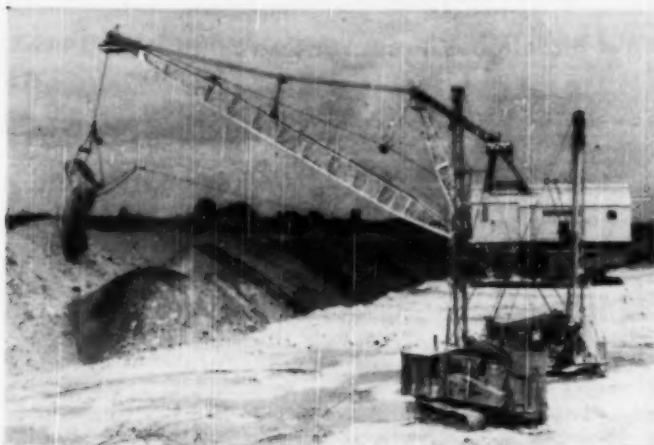
IN SPITE OF limitations on production imposed by John L. Lewis and uncertainty as to when the situation would return to normal,

1949 was characterized by a number of significant developments in both production and preparation. Underground, the mining-and-load-

ing machine and roof bolting held the center of the stage. In stripping, increased equipment capacity was paralleled by growing use of big augers and other equipment for increasing coal recovery after the stripping limit has been reached. And in preparation, growing emphasis on higher quality and increased coal recovery further stimulated mechanical cleaning and the installation of special equipment for treating fine coal, including



WITH QUALITY IMPROVEMENT hinging more and more on mechanical preparation, increased emphasis on recovery and beneficiation of fine sizes included growing installation of such cleaning and drying units as coal-washing tables and centrifugal filters.



MORE LARGE WALKING DRAGLINES helped strippers meet the problem of thicker overburden. Operators also went underground with small and large augers.

both coal-washing tables and flotation units.

Continuous Mining Proves Out—Experience in 1949 indicates that mining-and-loading machines are today averaging 200 to 400 tons per shift, depending upon seam thickness, with crews of 4 to 6 men. A new low-type unit was announced in December for seams as thin as 30 in, with the first machine scheduled for installation in Oklahoma. In addition to the two types already being manufactured, development of several additional units was actively under way.

To date, mining-and-loading units in operation in the United States have been applied in conventional room-and-pillar mining. There was considerable interest in the possibilities of semi-longwall, however, and a Canadian unit was especially developed for this type of production. Indications were that 1950 would see several experimental semi-longwall systems in operation in this country.

Mining Without Shooting Inaugurated—Mining without shooting, using conventional loading and cutting equipment, got a healthy start in 1949. Briefly, this system of production involves cutting the face up by a number of horizontal and shearing cuts and then bringing in the loading machine to remove the coal. Very high efficiencies were reported in work so far done.

The big auger, modified from the auger used by strippers to extend coal recovery, also showed signs of moving into position as a major

contender in the field of underground production. A number of machines were designed and orders were placed for actual installation. A modification for drilling slants in pitching coal was still under test at the end of the year, and some anthracite engineers were considering the design of other special machines for pitch mining, including one that would mine without shooting.

Belt slopes again led in type of opening for new mines where it is necessary to go down for the coal. Maximum lift, at a new Illinois operation, 42-in belt, is now 862 ft with a conveyor length, pulley centers, of 3,130 ft.

Conveyor Length Increases—All-conveyor mines with drift openings increased substantially in 1949, along with horizontal belts to supplement track haulage at certain others. At one mine in the latter class, installation of a 30-in steel-cord belt conveyor 10,900 ft long, head to tail, was completed at the end of the year. Operating at 300 fpm and powered by a single 200-hp motor, the belt will deliver 220 tph.

The year 1949 also marked substantial progress toward development of the stainless-steel belt for both underground and surface use, with substantial economies forecast.

Paralleling the trend toward increased trackless mining was the development and wider use of off-track auxiliaries. In addition to drills and cutters, these included new shuttle-car and loading-machine carriers, tractor-drawn trailers for men and materials, com-

pressors, rock dusters, and so on. At least one mining company, reflecting the interest in diesel engines for underground use, particularly on haulage locomotives, was considering the use of diesel tractors for man-and-materials service. Another mine reportedly was going to combination trolley-and-battery tractors for handling men and materials in trackless mining.

Big mine cars again got the call where cars are employed, with units up to 30 tons in capacity for outside haulage at one new property. The drop-bottom car led the list, although new rotary-dump types were purchased in substantial numbers. Automatic couplers, steel wheels and high-strength corrosion-resisting alloys were widely employed, along with automatic trip-handling and caging equipment for hoisting and yard use, plus hoists for trip and car handling at conveyor discharges and transfer points in the sections. Barney-type trip-spotting units were increasingly employed at such points.

In the fields of cutting and drilling, the use of special alloy and carbide-tipped bits again showed an increase. New-type one-man bottom drills with plow-type handles for moving them also were employed in increasing numbers, along with the new flexible-shaft drill operating from a cutting-machine power take-off. Installation of bugdusters on shortwalls staged another major advance and one mine, to facilitate rock dusting at the face, was reported to have combined a small rock-dusting unit with the cutting unit. Air coal breaking registered new gains in 1949, along with multiple shooting with permissible explosives.

Roof Bolting Spreads—Timbering machines, many with special timber-carrying trailers, showed a substantial gain in 1949. Roof bolting spread rapidly and widely, with mounting evidence indicating that it will provide better roof support at a substantial reduction in cost compared to standard timbering. Developments included a spread in the use of expansion shells for anchoring bolts, increased use of small bolts, successful experiments with wooden bolts at a western Kentucky operations and plans to employ a flexible-type bolt where it is necessary to go far into the top to anchor a structurally weak strata immediately over the coal.

A substantial decrease in explosions in 1949 reflected increased attention to better ventilation, in-

cluding new fans, better stoppings, increased use of brattice lines and other means of positively directing the air to face, and more and better rock dusting. Sprinkling and other methods of controlling dust at the face showed a major increase, with at least one mine experimenting with a portable wet-type collector for use in the working sections.

Power and Drainage Improved—Electrically, the trend toward rectifiers and non-inflammable transformers continued, along with sectionalization of the underground distribution system and better grounding. Particular attention was devoted to grounding ac systems underground and progress was reported toward a more satisfactory solution.

Quick-coupling pipe for underground service registered another major advance for both sprinkling and dewatering service. Plastic pipe also found wider use, along with aluminum. In pumping, the deepwell unit found wider favor, with some companies with long-range drainage plans in view driving to the lowest parts of the properties and installing such units there for a permanent low-cost solution to the water-handling problem, both in anthracite and bituminous.

Activity in providing surface facilities was marked by a major increase in the use of prefabricated steel buildings, supplementing the wider use of Quonset-type construction and paralleling the growing use of corrugated steel for tunnel and slope lining, entry supports, fan adits, and so on. Handling supplies was increasingly mechanized by mobile cranes and such new applications of old equipment as the use of tractor-mounted loaders for timber handling. For tippie and surface-plant protection, an increasing number of operators were considering automatic sprinkling systems.

Stripping

ANOTHER INCREASE in the number of large walking draglines and another high in the capacity of shovel dippers paced stripping developments in 1949. Other major advances included a substantial increase in deep-pit operation in the anthracite region requiring hauling and backfilling of spoil, and growing use of big augers and standard deep-mining equipment to increase recovery in bituminous pits when the stripping limit is reached. And with progress in other directions,

New Bituminous Preparation Facilities in 1949*

Coal Company	Plant Location	Capacity, Net Tons of Feed per Hour	Preparation Equipment
Alabama Fuel & Iron Co.	Colgate, Ala. (8)	75	Deister Machine ¹
Alaska Coal Co.	Bellwood, W. Va.	30	Kanawha ²
Amherst Coal Co.	Lundale, W. Va.	130	McNally-Pittsburg ³
Amigo Smokeless Coal Co.	Amigo, W. Va.	40	Kanawha ²
Bakerstown Collieries, Inc.	Marion, W. Va.	100	Iowa Mfg. Co. ⁴
Beaver Coal & Mining Co.	Ligon, Ky.	100	McNally-Pittsburg ³
Belle Valley Coal Co.	Belleville, Ill.	50	Western Machinery ⁵
Bethlehem Collieries Corp.	Ellsworth, Pa. (4)	40	Deister Concentrator ⁶
Bevier Coal Co.	Bevier, Mo.	400	McNally-Pittsburg ³
Black Diamond Coal Mining Co.	Drakesboro, Ky. (2)	40	Deister Machine ⁵
Blackfoot Coal & Land Corp.	Oakland City, Ind. (5)	250	Robt. Holmes ⁷
Black Star Coal Corp.	Alva, Ky.	60	McNally-Pittsburg ³
Boone County Coal Corp.	Monroe, W. Va. (5)	150	McNally-Pittsburg ³
Buchanan County Coal Corp.	Big Rock, Va.	50	Fairmont ⁸
Buckeye Coal Co.	Nemacolin, Pa.	750	Nelson L. Davis ¹¹
Carmac Coal Co.	Carmac, Ill.	200	McNally-Pittsburg ³
Central Appalachian Coal Co.	Montgomery, W. Va.	350	Mines Engr. Co. ¹⁰
Central Coal Co.	Monterey, Tenn.	40	Roberts & Schaefer ¹¹
Central Coal Co.	Graham Sta., W. Va.	400	Jeffrey ¹²
Chicago, Wilmington & Franklin Coal Co.	Waitonville, Ill.	192	Western Machinery ⁵
Coal Service Corp.	Clarksburg, W. Va.	90	Mines Engr. Co. ¹⁰
Consolidation Coal Co. (Ky.)	Deane, Ky.	10	Roberts & Schaefer ¹¹
DJB Collieries, Inc.	Flanary, Ky.	200	Deister Concentrator ⁶
W. G. Duncan Coal Co.	Graham, Ky. (2)	75	Roberts & Schaefer ¹¹
	Luzerne, Ky.	200	McNally-Pittsburg ³
			McNally-Pittsburg ³
Eastern Coal Corp.	Stone, Ky.	125	Roberts & Schaefer ¹¹
Ethel-Chilton Mines, Inc.	Ethel, W. Va.	100	Prins ¹³
Evan-Jones Coal Co.	Jonesville, Alaska	50	Western Machinery ⁵
Evans Coal Co., Inc.	Bokoske, Okla. (9)	180	Deister Concentrator ⁶
Forsyth-Williamson Coal Co.	Cartersville, Ill.	300	McNally-Pittsburg ³
Freebrook Coal Corp.	Timblin, Pa.	150	Roberts & Schaefer ¹¹
Glenn Brooke Coal Co.	Charleston, W. Va.	250	Jeffrey ¹²
Greenwood Coal Co.	Brownwood, W. Va.	30	Kanawha ²
Guyan River Co.	Midkiff, Ky.	15	Deister Concentrator ⁶
	Adena, Ohio	340	McNally-Pittsburg ³
			Allen & Garcia ¹⁴
Hanna Coal Co.	Georgetown, Ohio	340	McNally-Pittsburg ³
		575	Allen & Garcia ¹⁴
			Fairmont ⁸
			Allen & Garcia ¹⁴
Ingle Coal Co.	Elberfeld, Ind. (2)	125	Templeton-Matthews ¹⁵
Island Creek Coal Co.	Hoiden, W. Va.	90	Robt. Holmes ⁷
	Scarlet, W. Va.	75	Roberts & Schaefer ¹¹
Jacobs Fork Pocahontas Coal Co.	Berwind, W. Va.	50	Roberts & Schaefer ¹¹
Jamison Coal & Coke Co.	Hostetter, Pa.	350	Fairmont ⁸
Jewell Ridge Coal Corp.	Jewell Valley, Pa.	40	Jeffrey ¹²
Key Coal Co.	Delphia, Ky.	100	Kanawha ²
Lillybrook Coal Co.	Astoria, Ill.	75	McNally-Pittsburg ³
Lion Coal Corp.	Killarney, W. Va.	40	McNally-Pittsburg ³
Lumaghi Coal Co.	Wattis, Utah	70	Kanawha ²
Lynn Camp Coal Co.	Collinsville, Ill.	250	Roberts & Schaefer ¹¹
	Grundy, Va.	40	Templeton-Matthews ¹⁵
			Kanawha ²
Mather Collieries	Mather, Pa.	440	Kanawha ²
Mary Gail Coal Co.	Manchester, Ky. (2)	150	Mines Engr. Co. ¹⁰
McGinnis & Graft Co.	Henryetta, Okla. (4)	60	McNally-Pittsburg ³
Mid-Continent Coal Co.	Marissa, Ill.	125	Roberts & Schaefer ¹¹
Montana Coal & Iron Co.	Washoe, Mont. (3)	30	Deister Concentrator ⁶
			Western Machinery ⁵
			Deister Concentrator ⁶
The New River Co.	Carlisle, W. Va.	350	Kanawha ²
New River & Pocahontas Consolidated Coal Co.			Jeffrey ¹²
	Layland, W. Va.	350	Fairmont ⁸
	Essex, Ill.	400	McNally-Pittsburg ³
Northern Illinois Coal Corp.	Essex, Ill. (2)	140	McNally-Pittsburg ³
	Wilmington, Ill.	150	McNally-Pittsburg ³

there was a further increase in the capacity of haulage units and in their power and speed.

Dipper Size Reaches New High—Installation of 45- and 49-cu yd dippers on shovels in eastern Ohio marked new highs in capacity in 1949, with preliminary results re-

ported as favorable. The high in dragline-bucket capacity, apparently first reached in Illinois, was 35 cu yd in the form of a perforated unit of high-strength alloy steel, keeping the weight down to the same as that of the previous 30-yd solid bucket.

The increasing need for moving

New Bituminous Preparation Facilities in 1949*

Coal Company	Plant Location	Capacity, Net Tons per Feed per Hour	Preparation Equipment
David Z. Norton Co.	St. Clairsville, Ohio....	70	Kanawha ²
Pandora Coal Mining Corp. ..	Dugger, Ind. (4).....	90	Deister Concentrator ¹
Peabody Coal Co.	Pana, Ill.	600	Roberts & Schaefer ²²
Peacock Coal Co.	Cheshire, Ohio	50	Kanawha ²
Pine Hill Smokeless Coal Co. .	Garrett, Pa.	50	Jeffrey ¹⁴
Pond Creek Pocahontas Co. .	Carver, Ky.	400	Fairmont ²²
Premier Pocahontas Collieries Co.	Bartley, W. Va.	210	Fairmont ²²
Princeton Mining Co.	Premier, W. Va.	70	Kanawha ²
Red Jacket Coal Corp.	Kings Sta., Ind.	900	Templeton-Matthews
	Red Jacket, W. Va.	340	McNally-Pittsburg ²⁵
Rochester & Pittsburgh Coal Co.	Four States, W. Va.	200	Heyl & Patterson ²²
			Jeffrey ¹⁴
Semet-Solvay Div.	Twin Rock, Pa.	75	Jeffrey ¹⁴
Sidwell Bros.	Indiana, Pa.	160	Jeffrey ¹⁴
Sizemore Mining Co.	Langacre, W. Va. (23)...	200	Deister Concentrator ¹
	Shawnee, Okla.	100	Prins ²²
South Union Coal Co.	McDowell, Ky. (3).....	320	Deister Machine ²²
			Robt. Holmes ¹⁰
Southern Collieries, Inc.	Edna, W. Va. (3).....	125	Ind. Engr. & Const. ¹⁰
Stonewall Coal & Coal Co.	Lake City, Tenn.	40	Fairmont ²²
Sunday Creek Coal Co.	Glenbrook, Ky.	80	Roberts & Schaefer ²²
Swords Creek Mining Corp. .	Corning, Ohio	250	Prins ²²
Sycamore Coal Co.	Hobson, Ohio	200	Prins ²²
Tenneco Coal Corp.	Swords Creek, Va.	40	Kanawha ²
Tennessee Coal, Iron & R.R. Co.	Patterson, Va. (2).....	120	Kanawha ²
	Dickeyville, Ind.	500	McNally-Pittsburg ²⁵
Trotter Coal Co.	Pratt City, Ala. (64)....	640	Deister Concentrator ¹
	Cassville, W. Va.	210	Roberts & Schaefer ²²
Twin Seam Mining Co.	Osage, W. Va.	50	Roberts & Schaefer ²²
United Electric Coal Cos.	Tuscaloosa, Ala. (2)....	20	Deister Concentrator ¹
United States Coal & Coke Co.	Dawson Spgs., Ky. (9)...	90	Deister Concentrator ¹
Vera Pocahontas Coal Co.	Munson, W. Va.	650	Kanawha ²
Vinton Coal & Coke Corp.	Landgraf, W. Va.	50	Fairmont ²²
Wairton Construction Co.	Vintondale, Pa.	80	Kanawha ²
Paul H. Weiss	Weirton, W. Va.	190	Jeffrey ¹⁴
Westmoreland Coal Co.	Southview, Pa.	75	Jeffrey ¹⁴
	Hutchinson, W. Va.	300	Fairmont ²²
W. Va. Coal & Transp. Corp. .	W. Columbia, W. Va.	225	Roberts & Schaefer ²²
Winco Black Coal Co.	Naugatuck, W. Va.	85	Jeffrey ¹⁴
Wyatt Coal Co.	Wyatt, W. Va.	190	McNally-Pittsburg ²⁵
Youngstown Mines Corp.	Dehue, W. Va.	350	Kanawha ²
			Nelson L. Davis ²²

*Includes additions and installations of new preparation equipment in existing structures. Where more than one unit was installed in a plant, the number, when available, appears in parentheses after the plant address.

(1) Plat-O table equipment. (2) Kanawha-Belknap calcium-chloride washing equipment. (3) McNally-Vissac thermal-drying equipment. (4) Portable tipple. (5) McNally-Norton unit washer.

(6) WKE (HMS) Mobil-Mill cleaning equipment. (7) SuperDuty No. 7 Diagonal-Deck coal-washing tables with Conco-revolving feed distributors as follows: Evans, 1; Semet-Solvay, 2; United Electric, 1. (8) McNally-Mogul washing equipment. (9) Plat-O coal-washing tables with Plat-O vibrating dewatering screen. (10) Drying plant incorporating Baughman Verti-Vane thermal dryers and auxiliaries.

(11) Raymond flash-drying equipment. (12) McNally-Brusset vacuum jig. (13) American Train-Dex air-cleaning equipment. (14) Plant revision including drying equipment. (15) McNally-Norton washing equipment.

(16) Conveyors and screens, Weirton

contract. (17) R&S Super-Airflow cleaning equipment. (18) Unit washer. (19) Including R&S Hydrosseparator washing equipment. (20) McNally-Carpenter centrifugal dryers.

(21) Prins Steamcleaner, 500 gpm wash water. (22) Chaus and flotation equipment. (23) Including R&S Hydrotator washing equipment and C.M.I. centrifugal and Raymond flash-drying equipment. (24) Including Jeffrey Baum-jig equipment. (25) R&S Hydrotator coal-washing equipment.

(26) Heavy media, two Rheon, McNally-Norton washer, five McNally-Carpenter dryers, tables, flotation. (27) R&S Hydrotator and Super-Airflow cleaning equipment. (28) Including wet cleaning of 8x14s. (29) Including Jeffrey diaphragm jig. (30) Including Prins washing equipment.

(31) Plat-O screen equipment. (32) Washing plant including two Prins Steamcleaner centrifugal thickeners for slurry. (33) River plant. (34) Washing equipment. (35) Including David heavy-media float-and-sink processing equipment. (36) Including Baum-jig washer.

deep overburden was reflected in several ways in operation using both small- and large-capacity equipment. These included more draglines and draglines with longer booms, tandem operation with both shovels and draglines and draglines alone, wider use of auxiliary equipment for taking off the topsoil, and

increasing employment of high-lift shovels in contour and hillside stripping, especially in the East and South. Scrapers maintained their position both in complete stripping and auxiliary service, while the number of special loaders, including the tractor-mounted type, apparently increased.

Auger drilling of overburden showed an increase in 1949, according to available indications, in part reflecting the design and manufacture of additional drilling units of this type. The big churn drill, however, led the field where much hard overburden is present, particularly in anthracite stripping. Where horizontal or auger-type vertical drills were employed, carbide-insert bits registered another gain, along with millisecond-delay shooting.

Auger Mining Sets New Record

—Most spectacular of the new units put into service by strip operators in 1949 was a 5-ft auger for drilling coal out of the highwall, a development and extension of the 24-in unit first pioneered in southern West Virginia in 1948. Production from the 5-ft unit, designed and built by a northern West Virginia producer, was reported to be 770 to 800 tons per shift with a four-man crew. Among other possible methods of employing the big auger, aside from making it the sole production unit in new deep mines in thin seams, was box-cutting at intervals of, say, 400 ft and augering between where normal stripping is impracticable. In all, it was estimated that some 20 auger jobs were in operation at the end of 1949, practically all in open pits.

In strip haulage, 1949 was characterized by a substantial increase in the installation of semi-trailers with capacities of 40 tons or more. Increases in capacity were accompanied by increases in power and speed, including experimental work with a 550-hp diesel tractor. The number of overburden haulers of both the straight-truck or crawler- or rubber-tired wagon type also rose substantially, along with an increase in engine power. Where straight trucks are employed in coal hauling, the number of installations using separate overhead hoists for dumping increased and the hoisting mechanisms were materially improved.

Material progress in developing safe and reliable grounding systems for 440- and 220-volt auxiliaries was a feature of stripping electrical developments, thus extending previous progress in the high-voltage field. Unit-type substations with integral grounding and lighting protection gained in numbers.

The value of F-M radio in promoting supervisory efficiency and reducing the time lost by stripping units resulted in several additional installations in 1949, with others planned for 1950.

New Anthracite Preparation Facilities in 1949*

Coal Company	Plant Location	Capacity, Net Tons of Feed per Hour	Preparation Equipment
Ashland Hydrotator Co.	Ashland, Pa.	15	Wilmot ¹
Atlas Coal Co.	Atlas, Pa.	15	Wilmot ²
Beaver Brook Coal Co.	Beaver Brook, Pa.	26	Wilmot ¹
Bernice-White Ash Coal Co.	Bernice, Pa.	18	Wilmot ¹
Calitz Coal Co.	Pottsville, Pa.	50	Wilmot ¹
G. & W. H. Carson, Inc.	Nerriestown, Pa. (3)	10	Deister Concentrator ¹
Diminick Coal Co.	Paxinos, Pa.	15	Wilmot ²
Franklin Hydrotator Coal Co.	Paxinos, Pa.	18	Wilmot ¹
General Dredging Co.	Ravine, Pa.	15	Wilmot ¹
Glen Alden Coal Co.	Bloomsburg, Pa.	8	Deister Concentrator ¹
Haven Coal & Supply Co.	Scranton, Pa. (3)	210	Menzies ²
Heover Mining Co.	Wanamie, Pa.	75	Wilmot ¹
J. A. C. Coal Co.	Tremont, Pa. (2)	12	Deister Concentrator ¹
Jonathan Coal Mining Co.	Paxinos, Pa.	40	Menzies ²
Johnson Coal Co.	Minersville, Pa. (4)	91	Wilmot ¹
Legal Coal Co.	Allison, Pa.	12	Deister Concentrator ¹
Lehigh Navigation Coal Co.	Pine Grove, Pa.	20	Deister Concentrator ¹
M. K. & F. Coal Co.	Shamokin, Pa.	15	Wilmot ¹
Mammoth Coal Co.	Goodspring, Pa.	40	Menzies ²
Maurer Coal Sales Co.	Lansford, Pa.	40	Wilmot ¹
Meadowside Coal Co.	Middleport, Pa. (2)	52	Menzies ²
Millersville Coal Co.	Raven Run, Pa. (2)	250	Menzies ²
Moffat Coal Co.	Shamokin, Pa.	20	Wilmot ¹
Morgan Coal Co.	Dunmore, Pa.	125	Chance ¹
N. & P. Coal Co.	Dunmore, Pa. (3)	31	Menzies ²
Oak Coal Yard	Millersville, Pa.	60	Menzies ²
Oakwood Coal Co.	Taylor, Pa. (3)	250	Menzies ²
Harry J. O'Brien	Old Forge, Pa. (4)	68	Menzies ²
Oxford Coal Co.	So. Tamaqua, Pa.	15	Wilmot ¹
Philadelphia & Reading Coal & Iron Co.	Shamokin, Pa.	15	Wilmot ¹
Pine Creek Coal Co.	Pine Grove, Pa. (2)	30	Wilmot ¹
Pizzoli Coal Co.	Suedberg, Pa. (2)	30	Wilmot ¹
Pompey Coal Co.	Pittston, Pa. (7)	36	Deister Concentrator ¹
Rhoads Contracting Co.	Locust Summit, Pa.	145	Western Machinery ¹
Rhonda Coal Co.	Spring Glen, Pa. (2)	30	Wilmot ¹
Thomas W. Schneck	Atlas, Pa.	15	Wilmot ¹
Stanley Coal Co.	Jessup, Pa.	50	Chance ¹
T. F. Steel Coal Co.	Lykens, Pa.	30	Wilmot ¹
Swatara Coal Co.	Dunmore, Pa.	5	Deister Concentrator ¹
	Suedberg, Pa. (2)	30	Wilmot ¹
	Shamokin, Pa.	20	Wilmot ¹
	Junedale, Pa.	25	Wilmot ¹
	Goodspring, Pa.	40	Menzies ²

*Includes contracts for installation of new preparation equipment in existing structures. Where more than one equipment unit was installed, the number, when available, appears in parentheses after the plant address.

1. Wilmot Hydrotator equipment. 2. Simplex jig equipment. 3. Hydrotator-

classifier oil-flotation equipment. 4. SuperDuty No. 7 Diagonal-Deck coal-washing tables with Conenco revolving feed distributors as follows: Corson, 1; Oxford, 1. 5. Menzies cone separators. 6. Conenco revolving feed distributor. 7. Chance sand-flotation equipment. 8. Flotation plant.

Preparation

MECHANICAL CLEANING was again the major goal in preparation in 1949, with especial attention to recovery and beneficiation of the finer sizes. Heavy-media staged another advance, while developments in the fine-coal field included another rise in the use of coal-washing tables and the beginning of a trend toward wider use of hydraulic classification, centrifugal thickeners and froth flotation in both anthracite and bituminous.

And with the growing attention to the preparation of the finer sizes, particularly bituminous, centrifugal filters, centrifugal dryers and thermal-drying units played a more important role.

Additional special heat-drying plants went into service in 1949 for

slurry reclamation. One was built without enclosure—in other words, the units were erected out in the open to facilitate moving in the future if desired.

Fines Cleaning Emphasized—Once again in 1949, many mechanical-cleaning units went into existing plants to handle specific sizes, particularly in the anthracite region. A majority of the anthracite installations, in fact, were placed in service to beneficiate the sizes from Buckwheat No. 1 down, and included a number of classifier-type machines for the finest sizes. Anthracite development also included the letting of a contract for an additional froth-flotation plant for fines in the southern region.

Bituminous operators contracted for both wet and dry equipment,

with dry units apparently staging a gain. The coal-washing table was widely favored for the finer sizes and a flotation plant went into operation in southern Illinois. The year also marked a full-year's operation of multi-spigot hydraulic classifying equipment for preparing table feed at a Pennsylvania plant. Capacity of the unit is stated to be in excess of 105 tph, 1/4x0 bituminous, with sharp classification equal to or better than in ore dressing. Table capacity and efficiency, particularly on difficult coals, are materially enhanced, it is stated, and a clean refuse can be drawn off the front-end cells. Under certain conditions, it also is declared that the overflow may be considered as clean coal, the exception being where cleaning of the extreme fines—down to 325 mesh—is required. Also for table cleaning, a new revolving feed distributor permits diversion of one of the pulp-stream fractions without disturbing the ratio of distribution of the remaining series of fractions.

Interest in special equipment for handling slurries was reflected in the installation of one new centrifugal thickener in southern West Virginia and plans for two more in Ohio. Test data, it is reported, indicate that the unit also is adaptable to the separation of sand and silt in cone cleaning.

Cleaning Range Maintained—Unit washers and semi-portable heavy-media plants apparently constituted a larger percentage of the cleaning capacity contracted for in 1949. Additional operators also installed portable tipples on rubber tires. Top sizes in mechanical cleaning again reached 8 in or more. In the majority of installations, however, the top was 4 to 6 in, and again the practice of washing coarse coal and bypassing or air cleaning the fines was evident at a number of plants.

Additional expansion in screening capacity apparently was another 1949 development reflecting another rise in the percentage of mechanically produced coal. Much of the increase was handled by vibrating equipment, which included a new unit with a three-slope deck—from steep to relatively flat—to control travel rate and increase screening efficiency.

Special preparation units developed put into use in 1949 included portable crushing or crushing and screening plants for use in strip pits where this relatively simple preparation would provide a desirable product.

Loader and Cleaner Sales Drop

Coal Mechanically Loaded and Cleaned Marked up Another Percentage Gain in 1949 While Sales of Loading Equipment Were Dropping 57.4% and Capacity of New Cleaning Equipment Was Declining 25 Percent

By W. H. YOUNG, Chief, Bituminous Coal Section, and R. L. ANDERSON, Engineer-Economist, U. S. Bureau of Mines, Washington, D. C.

SHIPMENTS of mechanical-loading equipment for underground use in coal mines in the United States,

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in terms of capacity, were less in 1949 than in any year since 1935. The capacity of mechanical-cleaning equipment sold for use at bitu-

minous mines was 25% less in 1949 than in 1948. Shuttle-car and "mother"-conveyor shipments declined 29 and 51%, respectively, from 1948.

This survey was made possible by the courteous cooperation of all known manufacturers of mechanical-cleaning equipment for bituminous coal and manufacturers of mechanical-loading and supplementary haulage equipment for use in all coal mines in the United States. Data from various trade journals also were utilized.

Mechanical-loading-unit and supplementary haulage equipment "Sales in 1949" represent shipments made during 1949. About 40% of the mechanical-cleaning equipment sold in 1949 was put in operation during the year. The remainder will be installed in 1950.

Table I—United States Bituminous and Lignite Production by Methods of Mining and Mechanical Cleaning

	1947		1948		1949*	
	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total
Surface stripping	139,395	22.1	139,506	23.3	99,000	22.8
Hand loaded underground	193,072	30.6	164,206	27.4	110,000	25.3
Mechanically loaded underground	298,157	47.3	295,806	49.3	226,000	51.9
Total production	630,624	100.0	599,518	100.0	435,000	100.0
Mechanically cleaned	174,436	27.7	180,880	30.2	137,000	31.5

*Preliminary

Mechanical Loading

Bituminous coal and lignite mechanically loaded in underground mines decreased from 298,157,281 tons in 1947 to 295,806,285 tons in 1948, or 0.8%. Mechanical loading in Pennsylvania anthracite mines dropped from 16,054,011 tons in 1947 to 15,742,368 tons in 1948, or 1.9%.

Table I gives data on bituminous and lignite production by methods of mining and mechanical cleaning for 1947-49, inclusive. As a result of strikes, diminished demand and the three-day work week in effect during most of the last half of 1949, production in that year totalled only 435,000,000 tons. Although the total output declined in 1949, the percentage mechanically loaded and mechanically cleaned increased.

Underground production of bituminous coal and lignite, by methods of loading, is shown in Table II. The preliminary figures for 1949 show that 67.3% of the underground output was loaded mechanically and the remainder was hand loaded into mine cars.

Types of Units Sold—Table III lists units of mechanical-loading equipment shipped to bituminous, anthracite and lignite mines for underground use in the United States in the years 1942-49, inclusive. Each type of equipment showed a large decrease in sales in 1949, compared to 1948. Sales of mobile loaders were less in 1949 than in any other year since 1943,

Table II—Underground Bituminous and Lignite Production by Methods of Loading

	1947		1948		1949*	
	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total	Thousands of Net Tons	Percent of Total
Loaded by machines†	252,611	51.4	253,044	55.0‡‡
Handled by conveyors§	45,546	9.3	42,762	9.3‡‡
Total mechanically loaded	298,157	60.7	295,806	64.3	226,000	67.3
Hand loaded	193,072	39.3	164,206	35.7	110,000	32.7
Total underground production	491,229	100.0	460,012	100.0	336,000	100.0

*Preliminary. †Includes mobile loaders, continuous miners, scrapers and conveyors equipped with duckbills of other self-loading heads. ‡Included under "Total mechanically mined." §Includes hand-loaded conveyors and pit-car loaders.

Table III—Units of Mechanical-Loading Equipment Sold to Bituminous, Anthracite and Lignite Mines as Reported by Manufacturers

	1942	1943	1944	1945	1946	1947	1948	1949	Percent Change, 1949 from 1948
Mobile loaders	352	234	286	359	495	486	725*	286*	-60.6
Scrapers†	29	15	39	26	35	35	49	18	-63.3
Conveyors‡	1,491	1,100	708	861	1,167	987	1,209	541	-55.3
Pit-car loaders	2	1	.....§	.....§	.....§	.....§	.....§	.....§	.....
Total	1,874	1,350	1,033	1,246	1,687	1,508	1,983	845	-57.4
Number of manufacturers reporting	28	24	22	25	24	23	22	22	.....

*Includes continuous miners. †Reported as scrapers or scraper haulers and holsts. ‡Includes hand-loaded conveyors and conveyors equipped with duckbills or other self-loading heads. §Census of sales of pit-car loaders discontinued in 1945.

Table IV—Sales of Mechanical-Loading Equipment in 1949 Compared to Machines in Active Use in Preceding Years

	1942	1943	1944	1945	1946	1947	1948	Number of Machines Sold as Reported by Manufacturers in 1949
Bituminous and Lignite Mines:								
Mobile loading machines.....	3,301	2,525	2,737	2,950	3,300	3,569	3,980	296
Scrapers.....	93	85	87	87	75	67	56	8
Pit-car loaders.....	481	321	241	142	93	71	37	...
Conveyors equipped with duckbills or other self-loading heads.....	1,062	1,224	1,331	1,383	1,521	1,531	1,632	...
Hand-loaded conveyors, number of units....	3,041	3,191	3,236	3,386	3,470	3,979	4,126	394
Anthracite Mines (Pennsylvania):								
Mobile loading machines.....	...	5	12	20	27	25	19	...
Scrapers.....	524	510	491	548	564	594	643	10
Pit-car loaders.....	...	...	...	...	...	...	...	...
Conveyors equipped with duckbills or other self-loading heads.....	...	...	...	...	...	...	...	...
Hand-loaded conveyors, number of units....	2,491	2,701	2,807	3,006	3,233	3,457	3,562	147

(1) Includes continuous miners. (2) Canvases of pit-car loader sales discontinued in 1945. (3) Sales of conveyors equipped with duckbills or other self-loading heads included with hand-loaded

conveyors. (4) Mobile loading machines included with scrapers. (5) Pit-car loaders and conveyors equipped with duckbills or other self-loading heads included with hand-loaded conveyors.

Table V—Mechanical-Loading Equipment in Actual Use in 1949, by States, Compared With Sales Reported in 1949

	Mobile Loaders*		Scrapers—		Conveyors†	
	In Use in 1948	Sales in 1949	In Use in 1948	Sales in 1949	In Use in 1948	Sales in 1949
Bituminous and Lignite Mines:						
Alabama.....	143	22	29	...	416	16
Arkansas.....	1	1	...	...	74	7
Colorado.....	32	7	...	2	326	6
Idaho.....	...	...	...	...	...	1
Illinois.....	565	23	...	1	18	13
Indiana.....	163	14	...	...	...	...
Iowa.....	7	...	...	...	7	...
Kansas.....	...	...	...	...	...	1
Kentucky.....	422	36	...	...	726	38
Maryland.....	1	...	...	...	38	...
Missouri.....	...	...	...	...	...	2
Montana.....	35	...	...	...	8	3
Nebraska.....	...	...	...	...	...	1
New Mexico.....	19	...	2	...	1	1
North Dakota.....	7	1	...	...	...	1
Ohio.....	195	12	...	...	178	3
Oklahoma.....	4	...	...	...	61	1
Pennsylvania.....	928	67	7	...	999	72
Tennessee.....	26	1	...	...	208	9
Utah.....	91	11	1	...	119	15
Virginia.....	118	8	...	...	197	8
Washington.....	...	...	9	...	92	...
West Virginia.....	1,197	92	...	5	2,017	193
Wyoming.....	29	1	8	...	302	3
Total.....	3,980	296	56	8	5,757	394
Pennsylvania anthracite mines....	19	...	643	10	3,562	147
Grand total.....	3,999	296	699	18	...	541

*Includes continuous miners. †Includes hand-loaded conveyors and conveyors equipped with duckbills or other self-loading heads. ‡Includes pit-car loaders and duckbills or other self-loading conveyors.

and it is necessary to go back to a depression year (1933) to find conveyor sales under 1949.

Exports of underground mechanical-loading equipment in 1949, in terms of capacity, amounted to 38% of shipments to United States mines, against 9% in 1948.

Types of Mechanical-Loading Equipment Sold Compared to Units

In Use—The trend in demand for various types of mechanical-loading equipment is shown in Table IV. Mobile loaders, self-loading conveyors and hand-loaded conveyors increased substantially from 1942 to 1948, while scrapers and pit-car loaders declined at bituminous and lignite mines.

Total mechanical-loading units of all types at Pennsylvania anthra-

cite mines increased from 3,015 in 1942 to 4,224 in 1948, or 40%, compared to a 41% increase at bituminous and lignite mines.

Types Purchased by States—

Table V shows the number of mobile loaders, scrapers and conveyor units shipped into the various states in 1949 and the number in use in 1948. West Virginia received the greatest number of mobile loaders and conveyors in 1949, followed by Pennsylvania and Kentucky.

Haulage Equipment

Shuttle Cars—Total sales of shuttle cars for use in United States coal mines, from our record of first sales in 1936 through 1949, was 3,392. Approximately 3,000 are in use at the present time.

Table VI shows the number of mobile loaders in bituminous and lignite mines by states and types of loading in 1947 and 1948. Total mobile loaders in use increased from 3,569 in 1947 to 3,980 in 1948, or 12%, while the number loading into shuttle cars rose from 907 to 1,186, or 31%. During 1948, 33% of the bituminous coal and lignite loaded by mobile loaders was handled by shuttle cars. The remainder was loaded onto conveyors (5%) or direct into mine cars (62%).

Sales of shuttle cars are listed by states for the first time in this report. Table VII shows total sales for the years 1936-48, inclusive, and 1949. West Virginia received the greatest number, or 30%. Pennsylvania, Kentucky, Illinois and Alabama follow in the order named.

"Mother" Conveyors—For the purpose of this study, a "mother"

Table VI—Number of Mobile Loaders in Use in Bituminous and Lignite Mines, by Types of Loading in Each State

	Number of Mobile Loaders*							
	Loading Direct Into Mine Cars		Loading Into Conveyors		Loading Into Shuttle Cars		Total Number in Use	
	1947	1948	1947	1948	1947	1948	1947	1948
Alabama	28	31	68	63	42	49	138	143
Arkansas .....	...	1	...	...	...	...	...	1
Colorado	12	16	2	...	14	16	28	32
Illinois	416	380	27	27	111	158	554	545
Indiana	103	111	...	...	39	52	142	163
Iowa	2	2	3	5	...	...	5	7
Kentucky	173	207	14	22	164	193	351	422
Maryland .....	...	...	...	...	3	1	3	1
Montana (bit. and lig.)	36	31	...	...	5	4	41	35
New Mexico	13	13	...	...	5	6	18	19
North Dakota (lig.)	7	7	...	...	...	...	7	7
Ohio	119	114	20	23	40	58	179	195
Oklahoma .....	...	...	4	4	...	...	4	4
Pennsylvania (bit.)	556	612	67	84	177	232	800	928
Tennessee	3	6	...	1	12	19	15	26
Utah	58	48	9	8	20	35	87	91
Virginia	79	84	3	4	19	27	98	115
Washington	1	...	...	...	...	...	1	...
West Virginia	772	791	47	74	252	332	1,071	1,197
Wyoming	22	25	4	...	4	4	30	29
Total	2,397	2,479	265	315	907	1,186	3,569	3,980

*Figures for 1948 include continuous miners.

Table VII—Sales of Shuttle Cars, 1936-48, Inclusive, and 1949, and Mother Conveyors for Coal Mines, 1947-49, by States

	Shuttle Cars		Mother Conveyors		
	1936-48	1949	1947	1948	1949
Bituminous and Lignite Mines:					
Alabama	181	35	5	6	...
Arkansas .....	...	...	1	...	...
Arizona .....	...	...	...	1	...
Colorado	41	10	1	...	3
Illinois	290	76	6	14	8
Indiana	125	22	8	...	4
Iowa .....	...	...	1	...	...
Kentucky	518	61	31	41	16
Missouri	2	1	...	...	...
Montana .....	...	...	...	...	...
New Mexico	13	...	...	...	...
No. Carolina .....	...	...	...	...	1
North Dakota	9	...	...	...	...
Ohio	127	19	23	5	3
Oklahoma .....	...	...	...	5	3
Pennsylvania	483	143	26	25	13
Tennessee	69	2	5	3	...
Utah	55	15	...	...	2
Virginia	70	5	3	4	3
West Virginia	850	156	90	12	58
Wyoming	14	3	...	...	1
Total	2,847	543	200	230	118
Pennsylvania anthracite	2	...	4	5	...
Grand total	2,849	543	204	235	118

conveyor is defined as a sectional extensible power-driven conveying unit that can handle over 500 ft of conveyor. Main-slope conveyors are excluded. The last three columns in Table VII show sales by states for the years 1947-48 and 1949.

Mechanical Cleaning

Reports from 18 manufacturers of bituminous-coal cleaning equipment show that the total capacity of 1949 sales was 13,300 net tons of clean coal per hour, compared to 17,700 tons in 1948—a decrease of 25%. Sales were made in 15 states. Two states received almost half the total capacity of the 1949 sales: West Virginia, 28%; Pennsylvania, 20%. Illinois, Ohio, Kentucky and Indiana followed in the order named.

Table VIII gives data on bituminous coal cleaned in 1948 by type of equipment, and also the annual capacity of equipment sold in 1949. Sales in 1949, by type of equipment, show jigs holding first place, with dense-media and launders following.

For comparative purposes, annual capacity of 1949 sales is based on the average number of days (217) bituminous mines were active in 1948. The capacity of all types of equipment sold in 1949 for cleaning bituminous coal by wet in

Table VIII—Bituminous Coal Cleaned in 1948 and Capacity of Equipment Sold in 1949, by Types¹

	Number of Plants in Operation ²	1948		Annual Capacity of Equipment Sold in 1949, Net Tons ⁴
		Net Tons of Cleaned Coal ³	Percent Cleaned by Each Type	
Wet Methods:				
1. Jigs	240	87,506,353	48.4	...
2. Concentrating tables	11	4,359,859	2.4	...
3. Classifiers	74	16,304,622	10.1	...
4. Launders	18	16,787,899	9.3	...
5. Dense-media	86	20,637,635	11.4	...
6. Jigs and concentrating tables	15	5,252,035	2.9	...
7. Other combinations of above	29	11,816,119	6.5	...
Total wet methods	482	164,664,522	91.0	18,500,000
Pneumatic methods	84	16,215,801	9.0	1,600,000
Grand total	566 ⁵	180,880,323	100.0	20,100,000

(1) A small percentage of the equipment sold in 1949 was placed in operation during that year and the remainder will be placed in operation during 1949 and 1950. (2) Includes plants operated by consumers at central washeries in Colorado and Pennsylvania. (3) Based on 217 days (average days mines were active in 1948) and 7.6 hr per day. (4) Included under "Total wet methods." (5) Includes a duplication of 64 plants using both wet and pneumatic methods; deducting this duplication gives a net total of 502 plants that cleaned coal in 1948.

methods was equivalent to 11.2% of the total cleaned in 1948, while the capacity of the pneumatic equipment sold in 1949 was 9.9% of the tonnage pneumatically cleaned in 1948.

The ratio of 1949 sales of new cleaning plants to additions or replacements of present plants, in terms of capacity, was 35% new plants and 65% additions or replacements.

Coal Safety in 1949

Fewer Fatalities, Lower Accident Rate and Absence of Major Disasters Add Up to Record Safety Year—Better Teamwork by All a Big Factor—Long-Term Record Shows Improving Trend—Roof-Bolting Promises Further Cuts

By FORREST T. MOYER

Chief, Accident Analysis Branch, U. S. Bureau of Mines

THREE OUTSTANDING achievements marked the coal-mining safety record in 1949: (1) fewer men were killed in the mines than in any other year; (2) the rate of fatalities was the lowest in the history of the industry; and (3) there were no major disasters (five or more fatalities in a single accident) during the calendar year. Each of these new records was notable and together they point to remarkable progress in coal-mine safety. The progress made in 1949 is attributed to the close cooperation in intensified accident-prevention programs by workers, mine officials and state and federal safety-inspection services.

It is estimated, from nearly complete records, that 593 men lost their lives in coal mines in 1949. This was 375 fewer than the former record low of 968 in 1946 and a reduction of 39%. Compared with 1948, the 1949 total represented a

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reduction of 41%, or 417 fewer fatal injuries.

The fatality rate in 1949 was lowered to 1.24 per million tons of coal mined, the lowest rate by a wide margin in the history of coal mining. It was a marked reduction of 19% from the previous low of 1.54 fatal injuries per million tons in 1948. The 1949 rate was achieved in the estimated production of 477,664,000 tons.

The long-term improvement in coal-mine safety may be gaged by comparison with the record of 10 years ago, in 1939. During that year, 1,078 men lost their lives at a rate of 2.41 per million tons in the mining of 447,977,000 tons. Although more coal was mined, the number of fatal injuries and the fatality rate in 1949 were only about half what they were in 1939.

Major Disasters—The calendar year 1940 was the first in accident statistical history to be free of major disasters in coal mining. The

last major disaster occurred Nov. 4, 1948, in a Maryland mine, when five men were suffocated by gas and smoked pulled underground from a burning fanhouse. At the time of writing, there has been no major disaster for more than 14 months. This is the longest period in coal history without a major disaster. The former longest period without disaster was the 12½ months between July 1, 1938, and July 14, 1939.

Without question, the disaster experience in coal mines has been improved appreciably since 1910, when 19 major disasters killed 492 men. The current record of no disaster since November, 1948, shows that improvement is continuing. However, as every coal man knows, gas and dust explosions and fires are not uncommon in present-day mining, but are controlled by constant guarding through safety controls. Gas and dust explosions did occur in coal mines during 1949 but they were "contained" largely by effective rockdusting and improved ventilation practices. In August, a fire started in an Illinois mine with 257 men underground. All men escaped—62 through the main hoisting shaft, 135 through a new intake shaft and 60 after ventilation changes had been made by management and after the trapped men were provided with protective devices by a state rescue team.

Bituminous Mines—At bituminous and lignite mines, it is estimated that 500 men lost their lives at work. This record low yearly total was far below the prior record of 795 fatalities in 1946. The 500 fatal injuries in 1949 occurred at the rate of 1.15 per million tons, which likewise was a new safety record. The 1949 record was a sharp reduction of 21% from the former low rate of 1.45 in 1948. This new record was attained during mining of 435,000,000 tons. Ten years ago, 867 men were killed at a rate of 2.19 in producing 396,631,000 tons. Of the total fatalities in 1949 at bituminous operations, 441 occurred in underground workings, 43 at surface works associated with deep mines and 16 at strippings.

Anthracite Mines—At Pennsylvania anthracite mines, an estimated 93 men were killed in 1949, a lower number than in any other year. This total was 47 fewer than

Coal-Mine Fatalities in the United States During 1949*

Cause and location	Bituminous		Pennsylvania Anthracite		Total	
	Number of fatalities	Rate per million short tons	Number of fatalities	Rate per million short tons	Number of fatalities	Rate per million short tons
Underground:						
Falls of roof and face	283	0.650	55	1.289	338	0.708
Haulage	104	0.239	14	0.328	118	0.247
Explosions: Local	3	0.007	5	0.117	8	0.016
Major						
Explosives	13	0.030	4	0.094	17	0.036
Electricity	12	0.027	..	..	12	0.025
Machinery	17	0.039	..	..	17	0.036
Shaft	3	0.007	2	0.047	5	0.010
Miscellaneous	6	0.014	5	0.117	11	0.023
Total underground	441	1.013	85	1.992	526	1.101
Stripping	16	0.037	1	0.024	17	0.036
Surface	43	0.099	7	0.164	50	0.104
Grand total, 1949	500	1.149	93	2.180	593	1.241
Grand total, 1948	870	1.451	140	2.450	1,010	1.538
Production, 1949 est.	435,000,000		42,664,000		477,664,000	
Production, 1948 est.	599,518,000		57,140,000		656,658,000	

*Estimated from nearly complete returns.

the former record low of 140 fatal injuries in 1948. The fatality rate likewise set a new low point of 2.18 per million tons, an 11% reduction from the prior low of 2.45 in 1948. The 1949 record was achieved during the production of 42,664,000 tons of clean anthracite.

The long term of improvement in anthracite safety is shown by comparison with the 1939 record of 211 fatalities occurring at a rate of 4.11 per million tons mined. It is also notable that no major disaster has occurred in anthracite since Dec. 11, 1947, a 25-month period to date.

At anthracite operations, 85 of the fatalities occurring in 1949 were in underground workings, seven at surface works associated with deep mines and one in stripping.

Causes of Accidents—The improvement in the 1949 safety record apparently was achieved through better controls of all the hazards at the mines. The fatality rate for each cause, shown in the accompanying table, was lower in 1949 except at surface works, where the rate was slightly less favorable.

Over the long-time period, the percentage distribution of fatal injuries, although varying from year to year, shows no wide changes. In 1949, falls of roof and face caused 57% of total fatalities—virtually the same as the 58% in 1939. Haulage fatalities in 1949 represented 20% of the total against 17% in 1939. The yearly proportion of fatal injuries from explosions varies with the number of explosion disasters. In 1949, explosions caused only 1% of the fatalities, in contrast to 4% in 1939. Electricity caused 2% of the deaths in 1949, against 5% in 1939. Fatalities at surface works represented 8% of the total in 1949, a much larger proportion than the 4% in 1939.

Falls of Roof and Face—Each year, roof and face falls cause the largest number of deaths in coal mines. In 1949, they were responsible for 338 fatalities—a rate of 0.71 per million tons. This was a substantial reduction from the rate of 0.87 in 1948.

Relief from the high fatality rate of this cause is promised by roof-bolting for roof support, a method advocated by the Bureau of Mines. The method has stirred wide comment and has been readily accepted in a number of coal mines in the past two years. Results have been encouraging. The method has special value where the roof has been difficult to hold.

In bituminous mines, an esti-

mated 283 men were killed by falls of roof and face in 1949, a sharp reduction from the 484 in 1948. The death rate was 0.65 per million tons compared with 0.81 in 1948.

At anthracite operations, the total of 55 men killed by roof and face falls in 1949 was well below the 85 in 1948. The 1949 rate of 1.29 per million tons likewise was substantially reduced from 1.49 in 1948. Continued improvement to the degree indicated by the 1949 statistics would have a marked effect upon safety.

Haulage—Underground accidents caused by mine cars and locomotives killed 118 men in 1949, or 48 fewer than in 1948. However, with lower production in 1949, the rate of occurrence of haulage fatalities was only slightly lower than in 1948.

In bituminous, haulage is estimated to have killed 104 men, 50 fewer than in 1948. The 1949 fatality rate, however, was only a little more favorable than in 1948 because of decreased production. At anthracite operations, the haulage fatality rate receded from 1948, with a total of 14 men, two more than in 1948, killed. The 1949 rate of 0.33 per million tons was much less favorable than 0.21 in 1948.

Gas and Dust Explosions—There were no major disasters from gas or dust explosions in 1949. However, four local explosions killed eight men. The 1949 fatality rate of 0.02 per million tons was much better than in 1948, when 46 men were killed in explosions—a rate of 0.07.

One of the local explosions in 1949, killing three men, was in a bituminous mine. In contrast, three major and six local explosions in bituminous mines in 1948 killed 44 men. In anthracite mines during 1949, three local explosions caused five fatalities. During 1948 there was no major explosion and only one local explosion, which killed two men. The over-all fatality record of explosions in 1949 indicates better control of the explosion hazard through improved rockdusting, ventilation and dust control.

Explosives—Although the coal industry is the largest consumer of industrial explosives, only 17 of the 593 fatal injuries in 1949 were chargeable to their use and handling. Fatalities from gas and dust explosions in which explosives may have been a contributing factor are not included in this cause classification. As a direct cause of fatal accidents in 1949, explosives killed 13

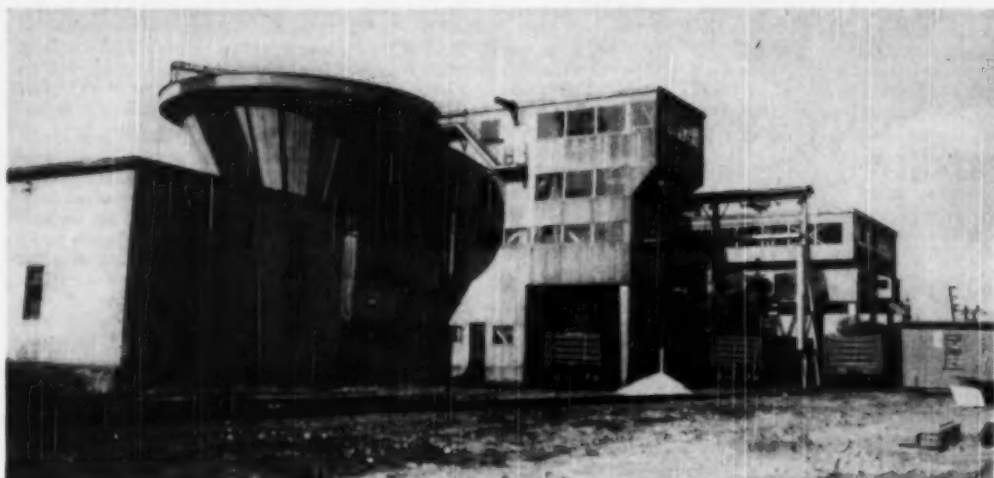
men in bituminous and four in anthracite. This experience, measured by respective rates of 0.03 and 0.09 fatalities per million tons, was a big improvement over 1948, when 22 men in bituminous and 9 in anthracite mines were killed.

Electricity—Fatality experience from electrical accidents was improved in 1949. Underground accidents caused directly by electric current resulted in the death of 12 men in 1949, eight fewer than in 1948. All 12 fatalities were in bituminous mines. The rate of 0.03 fatalities per million tons from electricity was a slight improvement over 1948. The 1949 fatality experience with electricity indicates better protection and safeguards against accidents.

Machinery—Although machines are being used more extensively each year, it is apparent that the hazards are being carefully controlled. The fatality record from machines was more favorable in 1949, with a total of 17 men, 9 fewer than in 1948, killed in 1949. All fatalities from machines in 1949 were in bituminous mines. The rate of 0.04 per million tons was the same as in 1948. No fatalities were caused by machines in anthracite, whereas this hazard was responsible for one death in 1948.

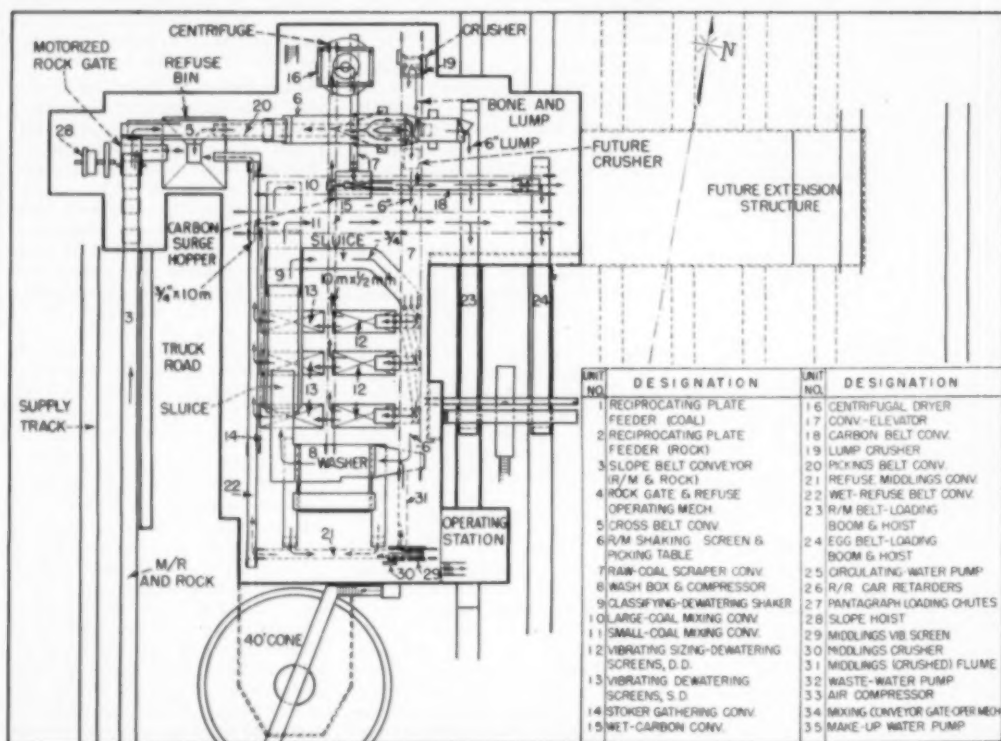
Other Causes—Of the total coal-mine fatalities, nearly 90% resulted from the principal causes previously discussed. The remaining 83 fatalities resulted from a variety of minor causes in underground, stripping and surface work at deep mines. Safety at both bituminous and anthracite strippings improved markedly in 1949. The record for these operations was 17 fatalities at a rate of 0.04 per million tons, compared with 56 fatalities at a rate of 0.09 in 1948. In surface work at deep mines, 50 men were killed at work in 1949. Of these, 43 fatal injuries were at bituminous and seven at anthracite mines.

Non-Fatal Injuries—A tentative total of 38,200 non-fatal lost-time injuries is estimated to have occurred at all coal mines in 1949—a rate of 79.97 per million tons. In bituminous, the estimated total of 29,800 non-fatal injuries represented a rate of 68.51 per million tons. The tentative total of 8,400 non-fatal injuries at anthracite operations in 1949 is estimated to have occurred at a rate of 196.89 per million tons. These estimates of non-fatal injuries may be revised as detailed reports are received from coal-mining companies.



HOME OF REGENT COAL. With a present rated capacity of 400 tph, the plant is designed for ready installation of additional loading, centrifugal drying, washing and thermal-drying equipment.

Efficiency and Flexibility Mark



JONAY PLANT LAYOUT and coal flow from slope belt to loading points.



A SLOPE BELT feeds the Jonay plant. All mine rock and plant refuse is brought to a single bin immediately to the right of the supply track.

Jonay Preparation

Designed for Maximum Results in Washing, Sizing and Dewatering, New Jonay Plant Can Be Readily Expanded to Meet Changing Markets and Sources of Coal

INCORPORATING maximum flexibility to meet changing market conditions and designed for operation with a minimum of labor and maintenance, the new preparation plant serving the Jonay mine of the Templeton Coal Co., Sullivan, Ind., is equipped to wash everything from 6 in down, mechanically dry the stoker sizes, and crush as needed for supplying stoker demands, with the crushed product going through the normal preparation circuit, thus preserving to the maximum the natural physical and chemical characteristics of the product.

Plant Readily Expandable—The Jonay installation is termed "a basic plant" by the designers—Templeton-Matthews Corp., Terre Haute, Ind.—because it lends itself to ready expansion in both capacity and the operations that can be performed on the coal. Examples of future steps that may be taken are:

1. Loading of additional sizes on additional tracks by extending the

cross mixing conveyors and supporting structure.

2. Additional centrifugal drying by extending the present bay.

3. Additional washing capacity by extending the washing bay.

4. Addition of thermal drying of stoker sizes by extending the present stoker gathering conveyor.

The basic design also is such that the plant can readily be adapted to use at shaft, slope or drift mines, with or without surface storage up to 5,000 to 6,000 tons, if desired. Jonay is a belt-slope operation using track loaders and drop-bottom cars.

Rated capacity of the Jonay plant as presently set up with one washing unit is 400 tph. Three sizes are loaded on three tracks, with provision for three additional sizes on three more tracks in the future. All heavy equipment and all high-frequency vibrating equipment is kept on or near the ground, with the result that the maximum height of the roof is 43 ft. Mine rock and plant refuse all wind up in one refuse bin, designed for either

truck or larry disposal, with trucking the present practice.

Selected Sizes Crushed in Raw-Coal Circuit—Crushing facilities now installed or provided for in the design make possible the reduction of selected sizes in the basic raw-coal circuit by arranging the pick-up points so that the crushed resultants combine with the natural raw-coal feed to the washing circuit. This entailed some added area in the washed-coal classifying and dewatering screen, but avoided the expense of a separate crushing, screening and remixing circuit. Also, as previously noted, combining the crushed coal in this way results in minimum disturbance of the natural coal characteristics.

Circulating water from all the units in the plant is collected in a central flume built into the plant floor. This flume delivers to a large concrete sump under the settling cone. This sump was constructed as an integral part of the plant foundation by carrying the piers down and pouring walls between them to form the sump. The main circulating-water pump drawing from this sump is placed in a pit alongside.

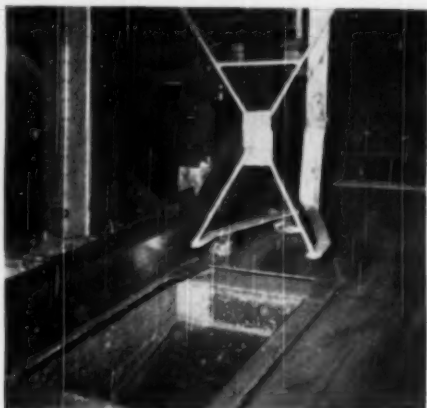
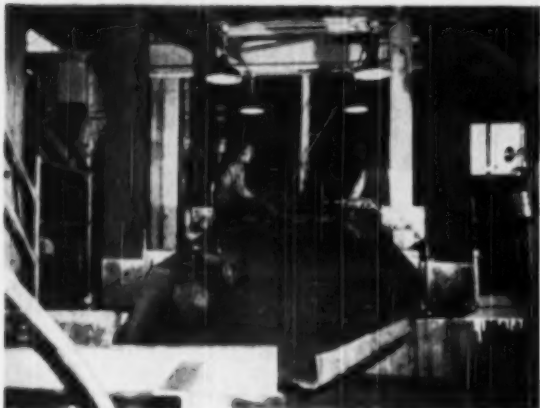
The lower floor of the plant is sloped to the central flume so that all drip and overflow water naturally drains to the flume. This makes it possible to clean the upper floors by flushing the material down into the flume, easing the clean-up job materially.

Flexibility Permits Handling Second Seam—While present Jonay production comes from the Indiana No. 6 seam, the plant was designed to handle coal from either the No. 6 or the No. 5—a major reason for building in maximum flexibility to meet present and possible future requirements.

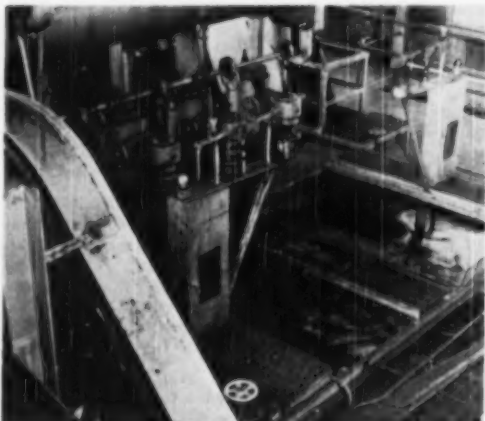
Ash reduction was, of course, a No. 1 goal in plant design. Some bands are encountered in the No. 6 presently being mined, but most of the impurities are roof material since the top is tender. A fine gray clay also is encountered and required some changes in fine-coal dewatering screens. The source of this clay is not definitely known but is believed to be the bottom.

The coal is washed at a specific gravity of about 1.50, and the goal is an ash of 8½ to 9% in the screenings, along with mechanical dewatering to the point where freezing will occur rarely, if at all. Jonay production is shipped over the Milwaukee Road and is sold under the

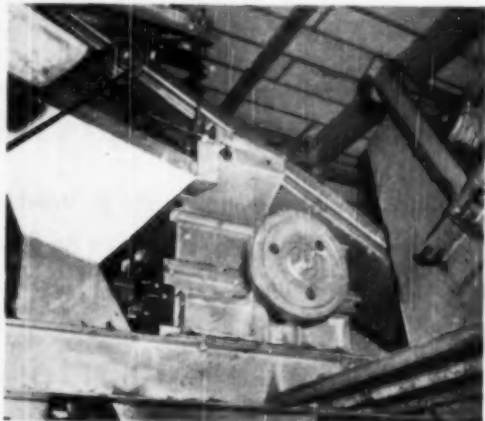
Precision Cleaning and Thorough Dewatering Characterize Jonay



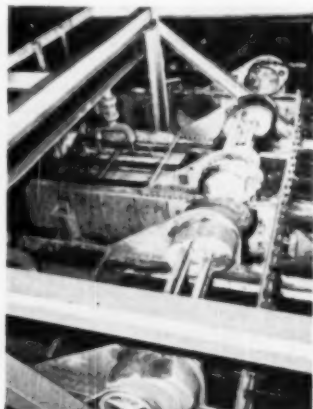
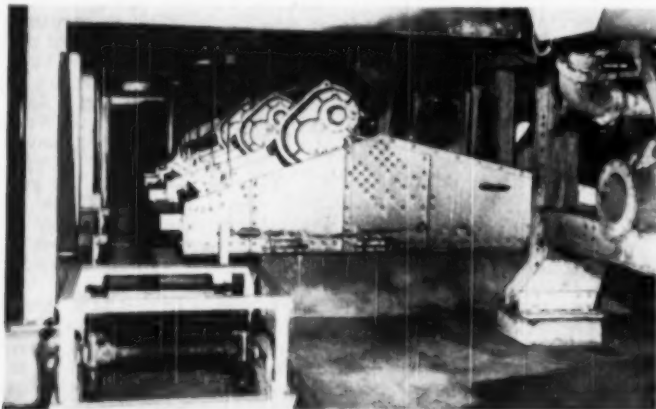
SHAKING TABLE with mine-made splitter (right) facilitates picking with a minimum of labor. Bone and slabby coal slide under the splitter into the center opening for crushing prior to washing.



ALL RAW AND RECIRCULATED COAL under 6 in passes through this air-pulsated jig. The goal is a screenings ash of $8\frac{1}{2}$ to 9%.



WASHER MIDDLEINGS are screened and the oversize crushed to increase coal recovery and serve as bedding material.



TWO BATTERIES of vibrating screens (right and left), plus a centrifugal dryer, reduce moisture in the stoker sizes to a point where little or no freezing is expected during the winter season.

trade name "Regent" by the Sterling-Midland Coal Co.

Coal and Rock Fed Separately—Plant feed comes up the slope belt from a 300-ton two-section storage hopper on the bottom arranged for bottom dumping. One section, with a two-speed plate feeder, has a capacity of 200 tons and is used for coal only. The second section, with a constant-speed feeder inclined for self-cleaning, is used for either coal or rock. Since this section is separate, the rock can be put on the belt by itself. At the top, a remotely controlled motorized gate, interlocked so that it cannot be opened with the coal circuit open beyond it, diverts the rock into the central refuse bin.

When feeding from the coal section alone, the feeder for his section can be speeded up to deliver 400 tph to the belt. When feeding from the rock section, the coal-section feeder can be cut back so that the two together deliver 400 tph. Steam jets will be installed at the top of the slope belt to kill the dust and keep the plant cleaner.

From the slope belt, run-of-mine is discharged to a short cross belt leading to the raw-coal screen—a pendulum-hung crank-drive unit. The screen is equipped with 6-in round-hole plate, minus-6-in going down a lower-deck extension to the lower strand of the raw-coal scraper feeding the washer.

Mine-Built Splitter Speeds Picking—Plus-6-in raw coal flows onto a shaking picking-table with center opening for bone. As presently operated, a special mine-made splitter (see illustration) diverts the lump to either side of the table for picking and permits slabby material and bone to slide into the center opening.

Material through the center opening goes via the lower deck extension to the lower strand of the raw-coal scraper. Pickings drop through the chutes to a belt which takes them back to the central refuse bin. With the center opening and the splitter, picking labor was cut in half.

Picked lump can go over a stationary degradation screen to the lump boom—a belt unit with pantagraph chute for changing cars. A second similar boom handles screenings or other mixed sizes, while a temporary chute through the end of the building permits loading a third size or mixture.

If desired, the degradation screen on the lower end of the table can be

lifted to divert the lump to the top strand of the raw-coal scraper. Thus, this top strand can be used to carry lump, bone and slabby material back to a McNally-Pittsburg double-roll crusher for reduction to the desired size and return to the lower strand of the conveyor for transmission to the washer. At present, this crusher reduces the feed to minus-6 in.

Design Provides for Additional Facilities—The raw-coal scraper is designed so that it can be extended north to receive minus-6-in coal from other mines via railroad cars and a track hopper on the up-track side of the plant. Provision also is made for installing an additional crusher between the strands of the raw-coal scraper immediately south of the discharge end of the picking-table to receive washed sizes from the cross-mixing conveyors via the top strand of the raw-coal scraper for reduction and return to the washing circuit.

Under this system, all material and crushed minus-6-in, plus any other crushed sizes made in the future, go via the lower strand of the raw-coal scraper to the washing facilities—presently a Type 5044E five-cell Link-Belt air-pulsated jig with mercury-switch control of gate operation.

Heavy sink from the first two washer cells is discharged to the lower run of a scraper-type refuse conveyor, in turn discharging to a wet-refuse belt leading to the central refuse bin.

Middlings from the second washer elevator are discharged to the top strand of the refuse conveyor and are elevated to single-deck Allis-Chalmers vibrator. Plus-1½-in made on the vibrator goes into an American ring pulverizer for reduction to approximately 1½ in minus and return to the wash box by flume. A four-section chute for the minus-1½-in middlings through the screen permits returning from one-fourth to all of this product to the washer for bedding material, any remaining portion going to the lower strand of the refuse conveyor for final disposal.

Cleaned coal from the washer flows over a fixed dewatering sieve (Hendricks ½x1 herringbone slot) to the main dewatering and classifying screen. Water from the fixed sieve goes to the central flume in the preparation-plant floor via an under-screen collecting flume. The upper section of the classifying and dewatering screen is double decked; the lower, triple-decked. Sizes made

are 6x3, 3x2, 2x¾ and ¾x0. The 6x3 and 3x2 go to a two-compartment cross-mixing conveyor for loading, or mixing and loading. The 2x¾ goes to a compartment of a second cross-mixing unit.

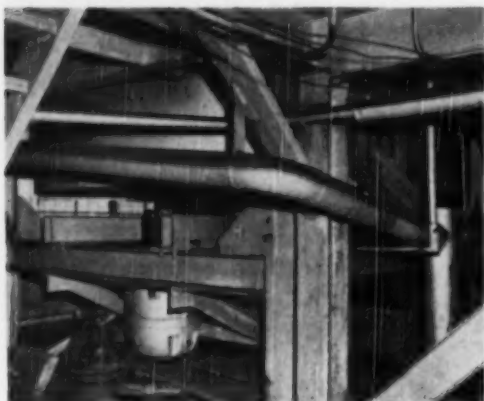
Loading to Additional Tracks Easily Accomplished—The feed-ends of these cross-mixing conveyors are dropped down as a means of keeping down plant height. The drives and supports are arranged so that they can be cut loose and moved out if it is desired to load on additional tracks in the future. Consequently, such a move would entail only adding to the conveyors and providing the supporting structure if loading was done by chute. If additional booms were added, appropriate additional structure and equipment would be necessary.

Both cross-mixing conveyors are equipped with manually-operated gates for diverting any washed size to the top strand of the raw-coal scraper for future crushing, as previously outlined. Gates to the booms and chutes are motorized and remotely controlled from main operating station.

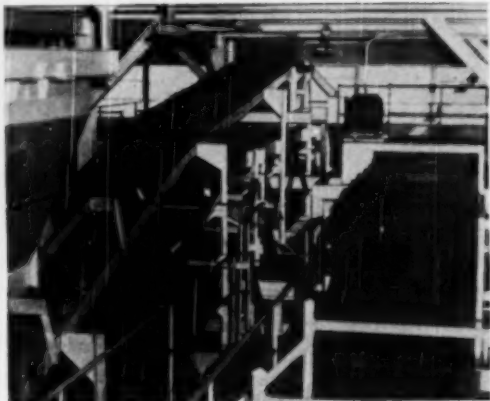
Minus-¾ from the classifying and dewatering screen is flumed over fixed sieves underneath the screen and in the discharge flume fitted with Bixby-Zimmer round-wire screens for preliminary drainage, the minus-1-mm and water through the sieves going to the central flume in the plant floor. From the main flume the minus-¾ is split three ways to three Robins Eliplex double-deck vibrators. The top decks are fitted with B-Z round-wire screens with 10-mesh openings. The first third of the bottom decks are fitted with triangular-profile screens and the remainder with round ½-mm openings. The triangular-profile screen was adopted as the answer to the blinding originally experienced with the gray clay in the coal.

The 10-mesh by ½-mm from the lower decks is discharged to a scraper conveyor arranged to deliver to a 48-in CMI continuous centrifugal dryer in the cold months and to the regular product conveyors in the warm months. The dryer product (or the undried coal in warm months) is fed to a Redler elevator delivering to a 5-ton surge hopper feeding to a belt conveyor equipped with a Reeves drive. The belt delivers to one of the cross-mixing conveyors for mixing as desired. The belt also is designed for extension to an outside track, where a carbon bin with a capacity of at

Flexibility and Low Operating Labor Keynotes in Design



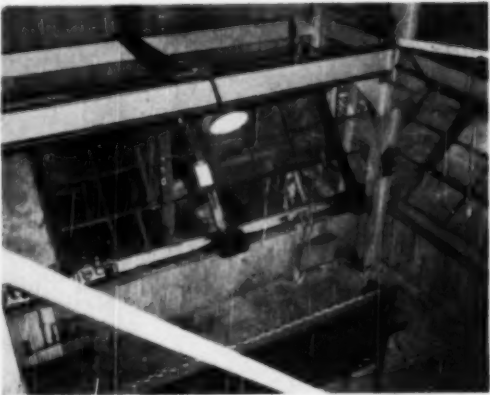
BACKING UP THE DEWATERING SCREENS, this centrifugal dryer puts the final touches on fine coal to prevent freezing.



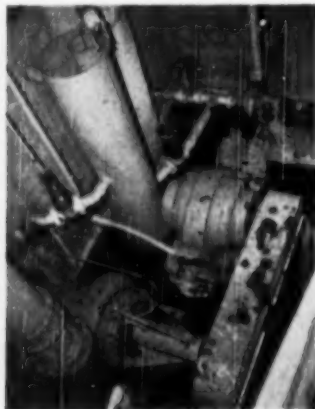
TWO TWO-COMPARTMENT cross-mixing conveyors, designed for ready extension, deliver washed and screened sizes for loading.



OPERATOR'S STATION includes outwardly sloping window bays for maximum visibility. The interlocking control panel was built up at the mine. Valve levers for the pneumatic retarder control are under the left-hand window bay.



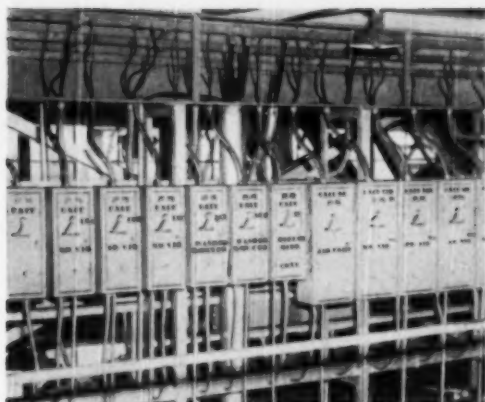
CENTRAL FLUME in the concrete floor of the plant receives all drip and overflow water and delivers to the main sump.



CIRCULATING PUMP (foreground) and standpipe for float-controlled waste-water pump (background) are in a pit.



AUTOMATICALLY CONTROLLED condenser pump improves plant heating and saves water-treating compound.



MOTOR CONTROLS are grouped at strategic locations in the plant which is operated by motors totaling approximately 1,000 hp.



JONAY PREPARATION AND PRODUCTION HEADS—Damon Pugh (left), outside foreman, and Troy Stout, mine manager.

least one carload may be installed for separate loading of this size in the future.

The $\frac{3}{4}$ -in by 10-mesh from the top decks is discharged to three single-deck Allis-Chalmers Low-Head screens, 10-mesh wire cloth, for final dewatering. The dried stoker coal is delivered by the collecting conveyor to one compartment of the cross-mixing conveyor handling the finer sizes. Minus-28-mesh goes to the central flume in the floor, along with centrifugal-dryer effluent. If thermal-drying equipment is installed in the future, the stoker-coal collecting conveyor following the screens can be extended south to deliver to the plant on the downtrack side.

Experience so far with the screens and centrifugal dryer indicate that about the maximum in mechanical drying is achieved, with the moisture being taken down to about the capillary film on the particles. It is believed that little or no freezing will be experienced, but if so, the plant design permits thermal drying to be added with a minimum of expense and little interruption in operation.

Structure Erected by Mine Force

—The Jonay plant is completely welded and was constructed with mine labor under the direction of mine supervisors. Ample room is provided around all equipment units and numerous stairs make for quick passage to all parts of the plant. In construction, 16-gage corrugated sheets were tack-welded over areas to be floored and served as walkways. When concrete was to be poured, the reinforcing mesh was laid on the sheets and they

were used as permanent steel forms. The only wood in the plant is certain screen hangers. Low maintenance over the plant life was a cardinal principle in design, even where initial cost was increased slightly.

The roof is 2-in gypsum plank with a 20-yr surface built up of felt and asphalt. Steel sash is used exclusively and for better architectural appearance $1\frac{1}{2}$ -in corrugated siding, rather than the usual $2\frac{1}{4}$ -in, was installed.

Controls Centralized in Operator's Station—The connected load for the plant is approximately 1,000 hp. General Electric motors and controls are used, with Square D pushbuttons, the latter chosen because their construction fitted in with the interlocked sequence control employed. All controls are centralized in an operator's station on the downtrack side of the loading booms. The station is fitted with outwardly slanting window bays to give the operator a better view of loading operations. Underneath the operator's station in the same extension is a tool and supply-room for the use of the operating and maintenance forces.

The operator's station is adjacent to the washery bay, making it possible, if desired, for the operator to also oversee the washing equipment. All motor, gate and boom controls are centered in the operator's station, including air valves for controlling the Webster car retarders.

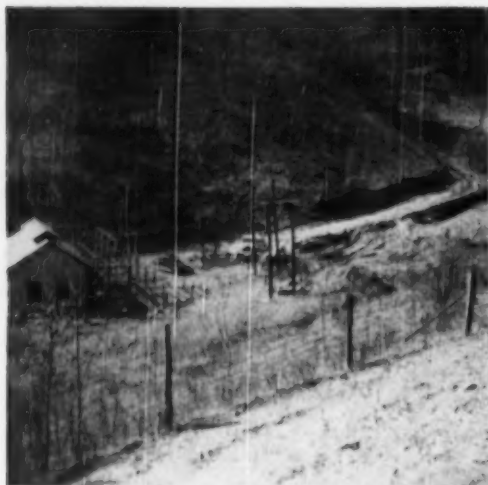
The motor and gate control panel were built up on the job from standard parts. As a result of the centralization of controls and the

design of the control station, it is possible to operate the plant with only three men, exclusive of pickers and ground men. Air for retarder operation is supplied by a compressor with automatic control.

Except for the belt conveyors (Jeffrey rollers and Goodyear belts), the plant equipment is primarily Link-Belt. A Union Universal boiler designed for stoker firing supplies steam for unit heaters, and the system includes a Whittington automatically-controlled pump to return condensate to the boiler feed tank. This, among other things, saves compound, since the boiler-feed water must be treated.

Efficient Water Handling Stressed—Wash water is recirculated by a 12x14 Type CW Allis-Chalmers pump driven by a 100-hp splashproof motor. Pump and motor are in a pit adjacent to the concrete sump under the 40-ft settling cone. To maintain the correct operating level in the sump, a second 4-in float-controlled pump is installed in the pit, pumping from a standpipe containing the float.

For better results it is planned to install a motor-operated valve in the suction line from the sump, which would be float-controlled and interlocked with the 4-in pump. This would result in smoother pump operation, since it would be drawing from the larger reserve in the sump, and, being fully automatic, might make it unnecessary to keep a man in attendance. The 4-in waste-water pump discharges to a flume, which also is used for final disposal of the material when it is necessary to drain the cone.



SHALLOW COVER was an important factor in selecting the hole site. Terrain at the shaft location is shown at the left. At the right is the pregrouting set-up, with mixer at the right and the grouting pump in the center.

Core Drilling for Air

Cost Cut Substantially by Drilling Shaft for Auxiliary Ventilation of Haulageway—Steps Included Pregrouting of Strata and Installation of Casing Down to the Solid—Positive Ventilation Provided Where Needed

By DAVID ZEGER

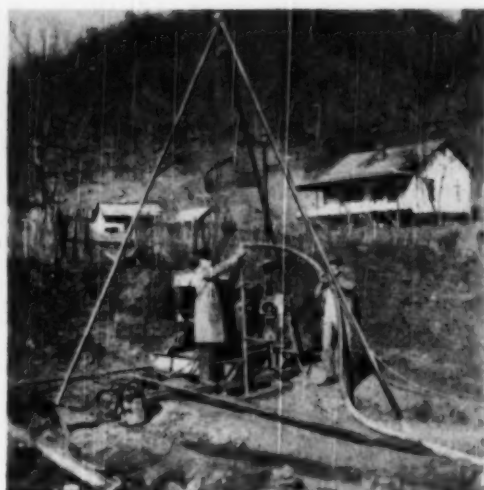
Mining Engineer, Consolidation Coal Co. (Ky.), Jenkins, Ky.

TWO YEARS AGO, Consolidation Coal Co. (Ky.) opened its Marshall's Branch portal 6 mi from Jenkins. This portal is near the center of Mine 204 workings, but the coal still had to be hauled approximately 5 mi to the central preparation plant. Along this haulway, a venti-

Abstract of a paper entitled "Sinking a Shaft by Core Drilling" presented at the 1949 meeting of the Big Sandy-Elkhorn Coal Mining Institute.



FIG. 1—IMPROVED VENTILATION between B and D was the goal in drilling the shaft at E.



LOWER COST was the major goal in core drilling new air shaft. The rig for shot drilling the main hole is shown at the left. At the right is the diamond drill employed in pregrouting the strata.

lation problem was encountered. The exhaust fan at A (Fig. 1) ventilated the haulway positively up to Point B, and the exhaust fan at C ventilated the haulway positively up to Point D. From B to D, however, the air in the haulway went in either direction at times, and the current was sluggish at other times. How to provide a definite flow of air for this haulway was the problem.

A study was made to determine the best means of solving the problem. The headings along the haulway were checked in an attempt to route the air from B or D or both to supply a substantial quantity. However, numerous stoppings would have had to be erected or repaired and two expensive airways would have had to be driven. The total investment was estimated at at least \$8,000, not including the added power cost to pull the air along the haulway. The airways on either side of the haulway were, in general, badly fallen and choked.

Solution: Shaft

After further study, it was decided that if air could be supplied from the outside near the center of the interval between B and D, the problem could be solved at a lower cost. At Point E there is only about 65 ft of cover. Therefore, this was the most logical point. The cost of a slope or extremely long drift was found to be too high. Consequently, a shaft was determined to be the best. Further study indicated that

a vertical core-drilled shaft would not only be lower in cost, but would have these further advantages: maximum area with minimum excavation, no lining, smooth sides for extra strength and less resistance to air travel, and high resistance against side pressures as a result of circular shape.

An intake at this point would shorten air travel, thus saving power. Also, looking ahead 8 or 10 yr, when the reserves of Mine 204 would be practically depleted and the barriers would be mined from A to E, the workings could be ventilated by the intake at E, air being pulled by the fan at A. When the barriers between E and D were to be mined, a fan could be set on the air shaft and pull air out at this point, a substation nearby providing the needed power.

Such shafts have been installed in the metal-mining districts, where it is understood the idea originated. Drilling was employed in sinking two 36-in shafts for the McLain Fire Brick Co., in Ohio, and in 1948 a 48-in hole was drilled for the Lorain Coal & Dock Co. at Blaine mine, also in Ohio.

Comparative Cost: Lower

The low cost and other advantages of an air shaft at Point E outweighed any other method of solving the problem. Cost of the completed core-drilled shaft is shown in Table I.

It can readily be seen that the average cost of approximately \$92

Table I—Cost of Completed Core-Drilled Shaft

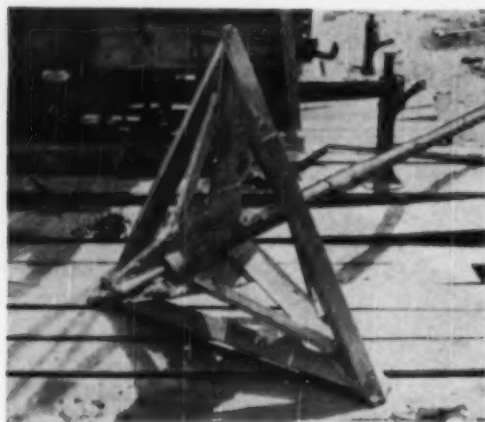
MOTT CORE DRILLING CO.:

Grouting Hole No. 1, 50 ft.	
Grouting Hole No. 2, 55 ft.	
105 ft @	
\$3.50 per	
foot....	\$ 367.50
Pressure grouting (lump sum)	250.00
63 ft 4 in of 48-in hole @ \$60	
per foot	3,800.00
10 ft of 60-in casing.....	137.22
20 ft of 50-in I.D. casing @	
\$22.50 per foot.....	450.00
8 ft of 50-in I.D. casing @ cost	162.65
Hauling 8 ft of casing.....	97.50
Installing and welding 8 ft of	
casing	67.00
	\$5,331.87

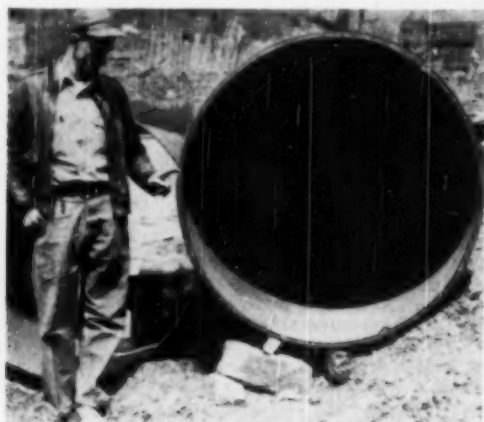
CONSOLIDATION:

Bulldozer fuel	\$ 11.56
Cement	330.00
Wire covering	21.00
Labor: 3 man-days @ \$14.05..	42.15
	\$ 404.71
Estimated miscellaneous ex-	
pense	90.84
	\$ 485.63
TOTAL COST, 63-ft 4-in	
shaft	\$5,817.52
COST PER FOOT of depth.	\$ 91.90

Core-Drilling Air Shaft Requires Planning, Pregrouting and Casing



MUD BIT (left) was used with water to loosen the soft material for pumping out of the hole. Shot barrel (right) was used in rock.



CHILLED-STEEL SHOT, being examined by the author (left) and drill foreman, work in notches in the edge of the shot barrel (right).

Table II—Estimated Cost of Sinking Conventional 6x6 Shaft

Sinking 62 ft 4 in @ \$68 per vertical ft	\$5,573.33
Timber lining, 63 ft 4 in @ \$36 per vertical ft	2,280.00
	\$7,853.33
Grouting off water @ 10% of cost	785.33
	\$8,638.66
Cost to Consol to level the area and build a fence around the shaft:	
Bulldozer fuel and labor	\$ 25.00
Fence material	300.00
Labor	250.00
Contingencies	50.00
	\$ 625.00
TOTAL COST of shaft	\$9,263.66
COST PER FOOT of depth	\$ 157.40

per foot of depth would have been lower had the depth of the hole been greater. In other words, the deeper the hole, the more the cost approaches \$60 per foot of depth. To sink a 6x6-ft shaft inside a timber lining by conventional methods is estimated in Table II.

The cost to sink a 4x4-ft shaft would be approximately the same as a 6x6, but the bidding contractor had never sunk a 4-ft shaft. Thus it can be noted that a shaft of this type would have cost 60% more than the drilled hole. If the shaft had been deeper, the difference in cost would have been somewhat greater.

Because of the badly fallen entries and other inside conditions, it was not considered possible to sink the shaft by lowering the muck through a pre-drilled 14- or 16-in hole into the mine cars below.

Method: Core Drilling

A contract was let to the Mott Core Drilling Co., Huntington, W. Va. Fig. 4 shows the surface features in relation to the mine headings, demonstrating why the chosen site was selected. Consol graded the site to provide a good working area for the drill truck, diverted a small stream, and made a levee to keep water away from the site.

1. Pregrouting—The first step in sinking the shaft was pregrouting the strata to fill cracks and crevices. This was done to keep water from flowing into the mine and to prevent freezing in the winter-time, which would result in rapid deterioration of the shaft walls. Since a swamp is nearby and water seeped into the mine at the shaft site, water would have been



CORE being pulled away from the shaft, with expansion bolt inserted for lifting.



STEEL SCREEN protects completed shaft.



CORES were removed from the hole in sections about 2 ft thick.

sure to flow without regrouting.

A mixture of 80 gal of water and 10 bags of cement was made in a grout mixer and pumped into the grout hole—a regular 3-in diamond-core hole drilled 50 ft deep at the spot where the shaft was to be. The cover at this point is 63 ft. Cement used in the first hole totalled 150 bags. However, before a pressure of over 100 psi could be maintained the grout began seeping out of a crack in the surface. Therefore, a second grout hole was drilled to 55 ft. A total of 97 bags of cement was pumped into the second hole and the pressure reached 600 psi, which assured well-grouted strata.

2. Casing—The next step was to install a 50-in-inside-diameter rolled-steel casing 5/16 in thick. A 7-ft hole was dug by hand. Then, a mud bit was used. The rotation

of this bit caused water pumped into the hole to mix with the surface dirt, and this mud was pumped out. The rocks and pebbles washed free from the dirt were loaded out by hand. Being in a swampy area, it is obvious that the overburden had no structure whatsoever. Therefore, to get the 50-in casing down to bedrock with a wall of cement around it, it was first necessary to put in a larger casing to keep out the muddy and sandy overburden. A 60-in casing 1/4 in thick and 10 ft high was worked down to bedrock at a depth of 15 ft and 29 bags of cement were put into the bottom to level the sloping bedrock and help keep out water (Fig. 3A).

3. Drilling—Next, actual drilling started. The cutting was done by the rotation of a short barrel, using chilled steel shot under the

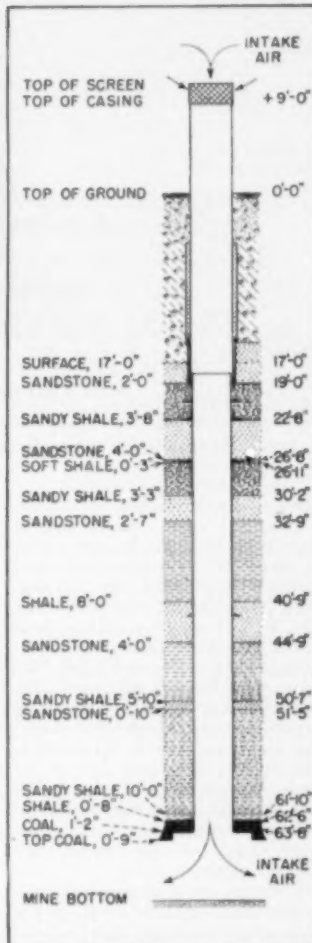


FIG. 2—SHAFT SECTION and strata.

Air Shaft Provides Positive Ventilation Quickly and at Low Cost

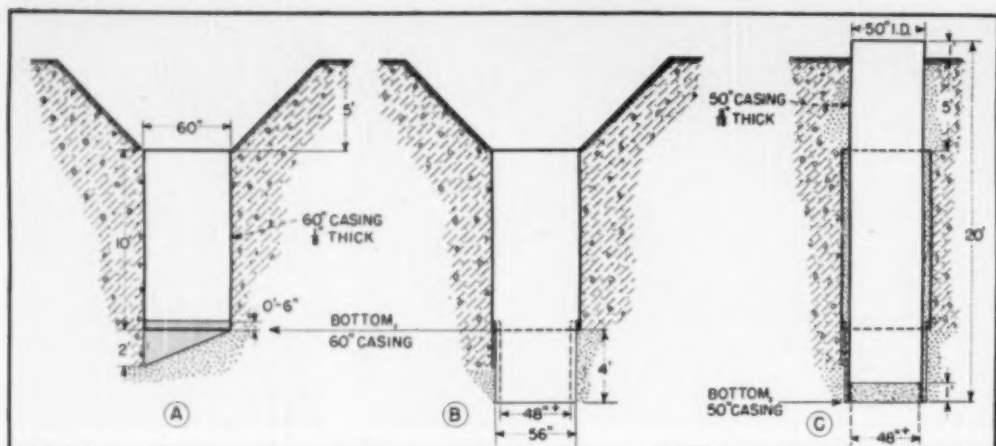


FIG. 3—CASING INSTALLATION was made in three stages.

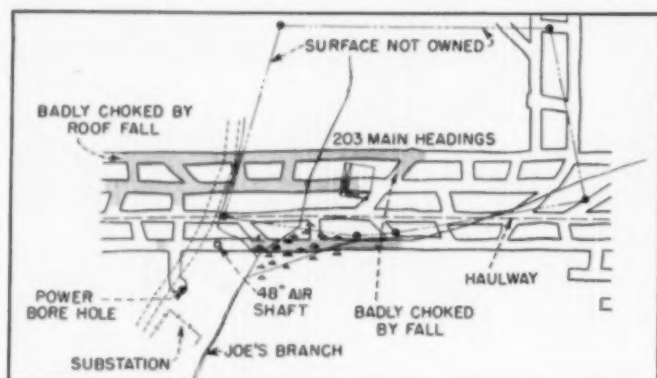


FIG. 4—SURFACE AND UNDERGROUND FEATURES influenced shaft location.

edges as a cutting medium. About 1 qt of shot was used in drilling each 5 ft. The shot barrel rotated at 60 rpm. The 48-in hole was drilled down to 19 ft and then reamed to a diameter of 56 in (Fig. 3B), so that the 50-in casing could be put in and project 1 ft above the ground (Fig. 3C). Four 5-ft sections were welded together while being lowered into the hole. Then a mixture of cement (205 bags) and water was poured between the two casings, over the top of the outer casing and 1 ft deep in the bottom to insure sealing off water and again provide a level surface upon which the shot barrel could resume drilling.

With the 50-in casing installed, drilling of the 45 ft of strata began. This work took 15 days, single-shifted. After the core was drilled, the shot barrel was removed from

the hole, an expansion bolt was put into the core and the core was pulled out in sections about 2 ft thick. The largest core pulled was 3 ft thick. A core could be broken by putting tension in the lifting cable and discharging a quarter-stick of dynamite along the side. Some shale cores had little structure and had to be loaded into a bucket by hand.

Some 5 ft of rock could be drilled in 4 hr, but it took a little more time to pull the core. Shale and sandstone were not hard to drill but, oddly enough, drilling through coal took longer because the shot worked its way into fissures. Five pockets of fireclay in the wall of the shaft were reamed by hand and filled flush with cement.

4. Lining—Shaft walls can be lined with steel casing, gunite, ce-

ment, paints and plastics, but no covering was put on the wall of this shaft. Although two-thirds of the strata is shale, the little that does air-slack and fall into the mine during its relatively short life probably will not present a serious problem.

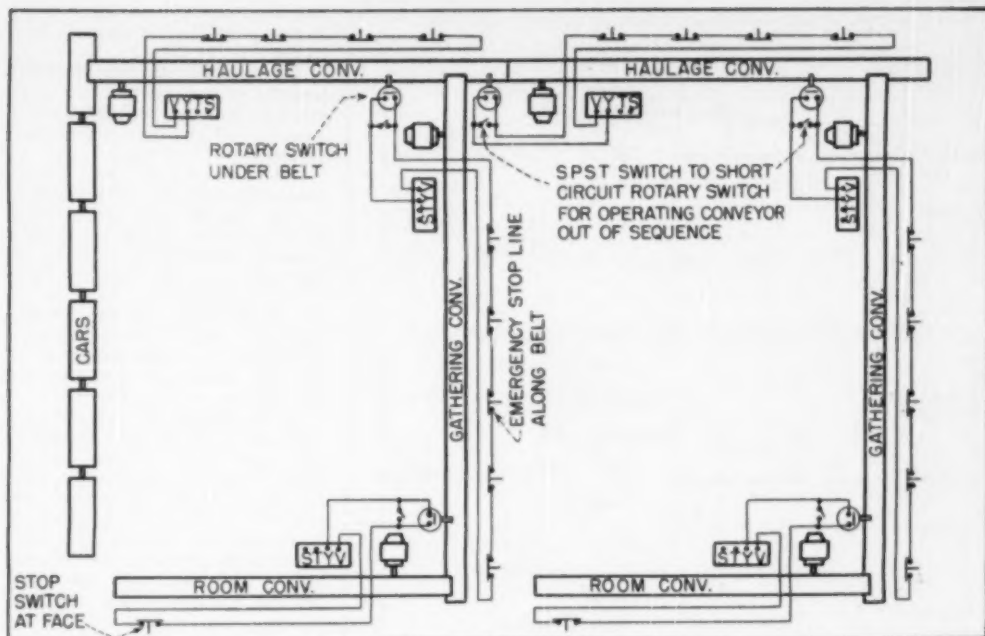
The hole drifted 16 in in a total depth of 63 ft 8 in, or approximately 1 in per 4 ft of depth.

Once the shaft was completed, two 4-ft sections of 50-in casing were welded on top of the installed casing and covered with a heavy screen to prevent any person or animal from falling in and to keep objects from being thrown into the mine. Also, the casing will prevent flooding the mine by a possible flash flood. This extra casing was much cheaper than installing any suitable type of fence around the shaft, plus drainage ditches and the ensuing maintenance cost.

Result: Positive Ventilation

The changes in ventilation made possible by the shaft have worked out well. From 8,000 to 10,000 cfm enters the shaft and positively ventilates the haulway in both directions at all times. If more air was needed, the intake could be substantially increased by a minor change near Point A (Fig. 1). At the shaft bottom there is a water-gage pressure of 0.03 in.

It may be said that besides having the advantages of a circular shaft, as previously mentioned, a core-drilled air shaft is a fast method of shaft sinking and much more economical than the conventional method.



1 Control Cable Along Belt—Control line along belt and electric interlocks added to the last accelerating contactor and to the reverse switch provide a simplified arrangement suitable for open-type equipment.

Controlling Belt Conveyors

Modern Methods for Sequence Control and Protection of Belt Conveyors—Two-Speed Operation and Spillage Protection — Comparative Costs and Advantages — Where and How to Use Controls

By W. F. ROBERTS, Electrical Engineer, Jeffrey Mfg. Co.

PORTABLE belt conveyors, especially designed for mine service, were first installed in this country in 1931. These were single conveyors for which there was only one control requirement: satisfactory starting and stopping of the belt.

The straight-line conveyors of 18 years ago have developed today into various combinations of tandem and cross conveyors serving, in many cases, a square mile or more of territory.

Abstract of a conference paper, Mining and Metal Industry Committee, presented at the 1949 meeting of the American Institute of Electrical Engineers.

Obviously, with such a system some arrangement of interlocked sequence control is necessary so that all the conveyors can be started or stopped from one or more stations. Provision also must be made so that piling up of coal at transfer points will not occur if any of the conveyors stop.

The extension of the conveyor system over such a large territory has also made it necessary to provide means for automatically protecting the belt if spillage or separation should occur.

This paper will discuss the following related control problems and

indicate some of the methods now being used to solve them:

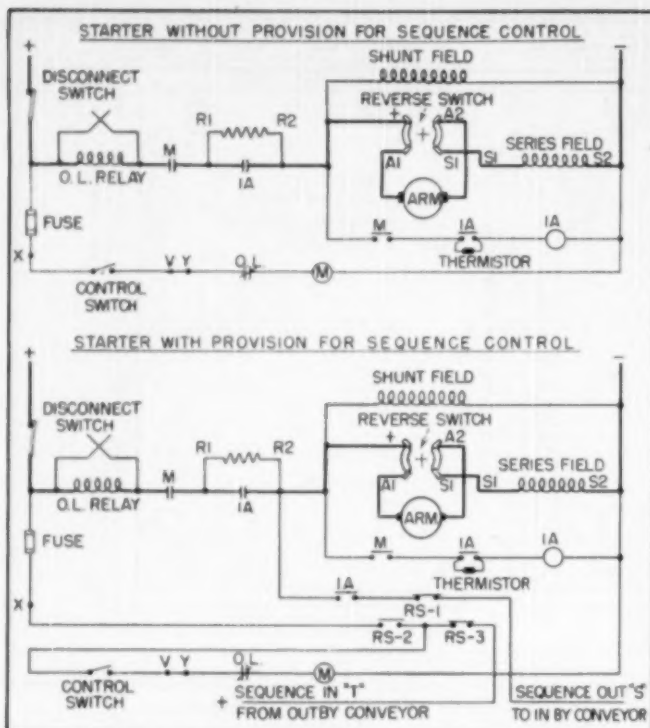
1. Interlocked sequence control.
2. Belt protective devices.
3. Two-speed belt operation.
4. Surge or belt spillage protection.

The time element necessarily limits the discussion to dc control, although most of the principles apply equally well to ac control systems.

INTERLOCKED SEQUENCE CONTROL—Interlocked sequence control can be applied to any system of conveyors if the controllers for these conveyors have automatic acceleration of the magnetic type. It doesn't matter if the reverse switch is of the manual or magnetic type, or if no reverse switch is used at all, provided the contactors automatically cut out the resistor after the control circuit is energized.

Rather than give an involved definition, I believe it is preferable to list the requirements that any successful interlocked control system must have. These are:

Sequence Control of Belt-Conveyor Operation and How to Obtain It



2 Starter Arrangements—Simplified diagram shows an automatic starter without provision for sequence control (top) and with such provision (bottom).

1. It must be possible to start or stop the system of conveyors from one or more locations.
2. When the conveyor at the discharge station is started, all other conveyors of the system must start in sequence in such a manner that no conveyor can start before the conveyor on which it discharges has started.
3. It should be possible to stop any conveyor in the system and, if desired, run it in reverse independent of the other conveyors. All conveyors discharging on the stopped or reversed conveyor must also stop.
4. When a conveyor is reversed, it should be taken out of sequence automatically.

METHODS OF OBTAINING SEQUENCE CONTROL—The control switch or pushbutton station of the conveyor at the discharge outby end of the system generally is used to start or stop the conveyors. The control switch for each of the inby conveyors must be left in "On" position so that the con-

tors can be energized or de-energized by remote control.

Two methods are generally used to obtain interlocked sequence control. One method requires stringing a control cable, usually No. 14 or No. 12 single conductor, along the belt line and adding electric interlocks to the last accelerating contactor and to the reverse switch. This arrangement is suitable for open-type equipment but is not approved by the U. S. Bureau of Mines.

In the second method, sequence is obtained by using a rotary switch in connection with each inby conveyor controller. This method is gaining favor because it does not require a sequence control line or extra interlocks in the controller. Also it is approved by the Bureau of Mines.

SEQUENCE CONTROL-LINE METHOD—Fig. 1 shows how the sequence control line goes to the various controllers in the conveyor system. The wire labeled "sequence in" is energized by the controller of the outby conveyor, while the

"sequence out" control line goes on to energize the controllers of inby conveyors.

Fig. 2 consists of a simplified diagram of an automatic starter without provision for sequence control and one with provision for sequence control.

The "sequence in" line, "T," is energized when the outby conveyor starts. Current then goes through Interlock RS-3, closed in the forward or coal-carrying direction of the reverse switch, Control-Switch-Coil M thus closing Contactor M. The motor starts with Resistor R1-R2 in the circuit. After a few seconds delay, the accelerating contactor, 1A, closes and short circuits the starting resistor, R1-R2.

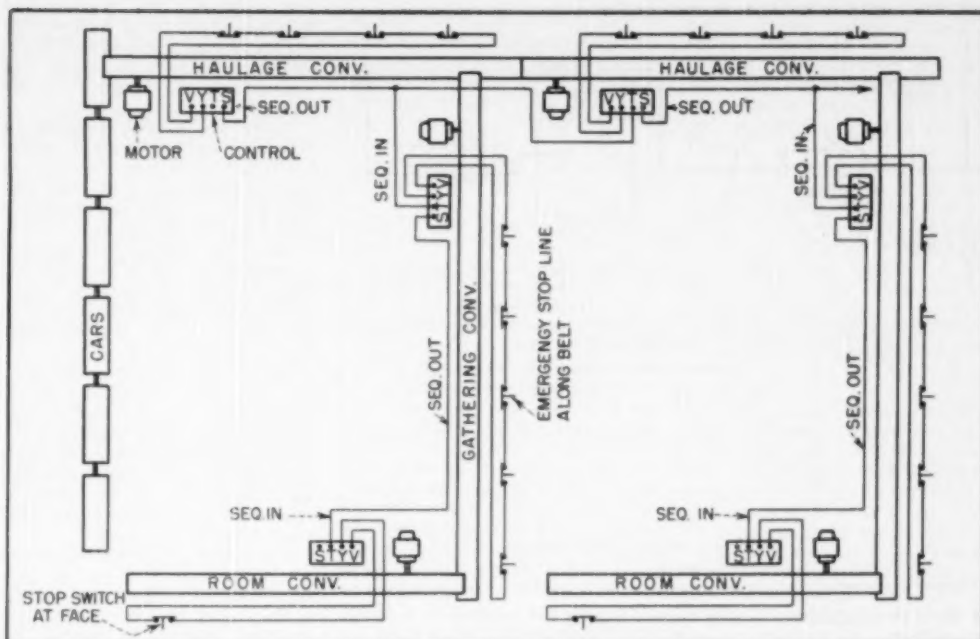
When Accelerating Contactor 1A closes, its normally open interlocks, 1A, also close. "Sequence-out" Line S then is energized through one of these interlocks and RS-1 on the reverse switch. Control current then goes on to the next inby conveyor. Since the "sequence out" line is not energized until the accelerating contactor closes, several seconds delay is obtained in starting the next motor in sequence. This, of course, reduces the peak demand in starting all of the conveyors.

When the reverse switch is thrown to reverse position, Interlocks RS-1 and RS-3 open while RS-2 closes. Opening of RS-1 and RS-3 de-energizes, both the "sequence in" and "sequence out" lines. Closing of Interlock RS-2 permits the conveyor to operate independently in reverse with all sequence lines dead.

ROTARY-SWITCH METHOD

A rotary switch, sometimes called a centrifugal or plugging switch, is used with each inby controller as an automatic start-stop control switch. Its shaft has a roller or wheel which contacts and is driven by the underside of the coal-carrying belt. Normally open contacts close when the belt reaches a predetermined speed in the coal-carrying direction. When the belt speed drops below a certain value, the contacts open. The belt speed at which the contacts open and close is adjustable. As an example, one type of switch can be adjusted to close at a minimum speed of 70 rpm and a maximum of 200 rpm. The minimum opening speed is 40 rpm and the maximum 150. The contacts open at a lower speed than is required for closing.

To prevent piling of coal at transfer points, the switch must be de-



3 Rotary-Switch Control—Rotary switch used with each inby controller as an automatic control switch requires no control line along the belt or extra interlocks in the controller and is approved by the U. S. Bureau of Mines.

signed so that the contacts remain open if the belt is reversed.

The rotary switch, for the conveyor it controls, is driven not by its own belt but by the belt which receives the coal. As an example, assume that Belts A, B and C are in series and D is a cross belt discharging onto C. Then, the rotary switch controlling B would be driven by A. Switch for C would be driven by B and switch-controlling D would be driven by C.

Fig. 3 shows the location of rotary switches and method of opening the control circuit to insert their normally open contacts.

A time delay between starting of the various belts in the system is inherent since the outby belt must attain a definite speed before the contacts of the rotary switch close and start the conveyor it controls. When the outby belt stops, the contacts open and the inby belt stops.

Any of the conveyors can be taken out of sequence and run independently by short circuiting the rotary switch as shown in Fig. 3.

EMERGENCY STOP LINE ALONG BELT—Whether a belt conveyor is part of a sequence system or is run as an individual unit, it is an essential safety measure to provide for stopping the belt at any

point along its length. This is especially true when men and supplies are handled or when men must cross the belt line. It is not sufficient to have pushbutton stations 200 or 300 ft apart, since in many cases the accident or damage occurs between stations. Ability to stop the belt instantly will many times prevent serious injury or damage to equipment.

Several manufacturers have available a small, rugged control switch of the maintaining-contact type with a lever for two-direction use. These switches, connected in the control circuit of the controller, as shown in most of the diagrams illustrated, may be located along the belt line at distances as far apart as 600 ft.

A plastic-covered wire rope, sold by most hardware stores as clothes-line, fastens to the lever and is strung along the belt line as a pull cord. The wire rope, attached to the ends of the centrally pivoted lever, can extend 300 ft in each direction. Switches usually are mounted on the roof of the mine.

One pull of the rope stops the conveyor but it requires two pulls to start it again. Thus a roof fall will not start a stopped conveyor. The two-pull feature also eliminates many accidents resulting from

miner's equipment catching the rope when crossing a stopped belt.

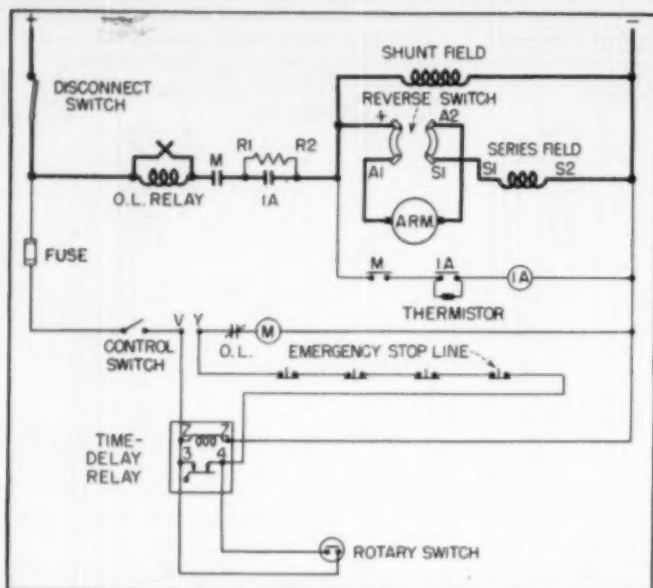
Switches should be of the maintaining-contact type so that the conveyor cannot be stopped at one station and restarted at another. For positive action they should be of the break-contact type, rather than the make-contact, to stop the belt.

The emergency stop line should be in the positive rather than the negative side of the control circuit. This requires running two control wires down the belt line. If the negative side of the circuit were used, one wire would be sufficient, since it would be grounded at the tail end of the conveyor. However, in using a negative line, if one of the stop switches becomes grounded, then all switches inby the grounded switch are short-circuited and cannot stop the conveyor. This, of course, defeats the purpose of the switches.

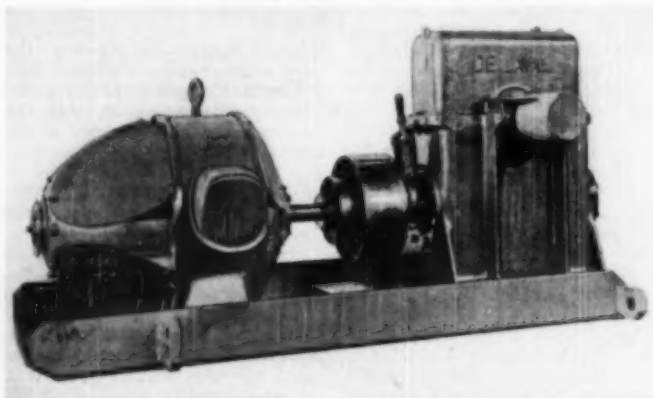
On the other hand, if a ground occurs with the emergency circuit positive, then the operating coil of the contactor is short-circuited and the conveyor stops. In other words, the positive type circuit is self-protecting.

BELT-PROTECTIVE DEVICES—Most safety or protective devices

Providing Belt Protection and Obtaining Two-Speed Operation



4 Belt Protection—Providing protection against belt breakdown or accident is accomplished by this simplified arrangement using a rotary switch and a small timing relay in conjunction with the magnetic starter of the motor.



5 Two-Speed Operation—Two-speed gear transmission between motor and speed reducer is satisfactory for handling either coal or men and supplies at half speed but is not designed for quick changes of speed.

are inspired by accidents resulting from failure of component parts and unforeseen occurrences that result in physical or property damage.

As an example, in Mine "A" the chain on the take-up device of a belt conveyor broke and released the tension on the belt. The motor, of course, kept running. The rotation of the drive pulleys against the stopped belt caused the lagging to burn up. Also, the lateral belts con-

tinued to dump coal on the stopped belt. A device to insure that the motor would shut down whenever the belt stops because of separation or loss of tension would have prevented this damage.

In Mine "B," a large lump of coal jammed between roof and belt so that the belt stopped but the motor kept running. Heat caused by the lagged drive pulleys rotating against the stopped belt set fire to the belting. A section of belting

was destroyed and lagging and bearings of the drive pulleys were ruined. Again, a belt-protective device would have eliminated the damage and the danger of a bad mine fire.

There are various methods of providing belt protection by assuring that the driving motor will stop automatically if the belt tension is lost or if the belt stops with power still on the motor.

One very simple arrangement, illustrated in Fig. 4, accomplishes this purpose by using a rotary switch and a small timing relay in conjunction with the magnetic starter of the motor.

The rotary switch is similar to the one used in sequence starting, except that (a) it has normally open contacts which must close for both forward and reverse direction of the belt; (b) the switch is driven by its own belt; (c) the switch is located at the head end and near the controller and motor.

Fig. 4 shows the simplified wiring of the controller with the belt protective device added to the control circuit. All the emergency stop switches should, of course, be closed. Then, when the control switch is closed to start the motor, current flows through Coil ZZ of the timing relay to the negative line, thus starting the timing cycle.

Current also flows through the normally closed contacts, 3-4, of the timing relay, the emergency stop switches, the overload trip, O.L., and the operating coil, M, of the main-line contactor. The motor starts and accelerates in the usual manner to full speed.

When the belt reaches a definite speed, the rotary switch contacts close and short circuit the timing relay contacts, 3-4, so that they can now be opened without stopping the motor. These contacts then open after the elapsing of the timing period, 2 to 5 sec, for which the timing relay is set.

Now, if the belt should stop because of a broken splice, failure of tension device, jamming of coal between roof and belt, etc., the rotary switch contacts open and stop the motor. It cannot start again until the control switch is opened to de-energize Coil ZZ and reset the timing relay.

With the control switch again closed, the motor will run for only 2 to 5 sec until the timing relay again opens Contacts 3-4. The motor cannot continue running because the rotary switch contacts cannot close to short-circuit Contacts 3-4 before the timing out period ends.

The fact that the motor will only

run a few seconds and then stop indicates that the belt protective device has functioned and the belt should be inspected.

TWO-SPEED BELT CONVEYOR

Many states have safety laws which limit the belt speed to 200 or 250 fpm when carrying men or supplies. The electrical control can be arranged to provide this slow speed when carrying men or supplies and twice the speed when carrying coal.

Two-speed belt conveyors also find an application where shuttle cars unload directly onto the belt. High speed is desirable so that the shuttle cars can unload quickly. Low speed is used when the belt is not carrying coal to save wear and tear on the belting, rollers and bearings. A pushbutton station or lever-operated switch usually is provided at the loading station so that the shuttle-car operator can control the speeding up of the belt.

Three methods are generally used to obtain two-speed control. The first two are by far the cheapest but are limited in application. The third method fits all applications. In brief, these methods are:

1. Inserting a resistor of proper ohms and capacity in series with the armature circuit for slow speed. The resistor, of course, reduces the voltage across the armature and consequently the speed. For high speed the resistor is short-circuited by a knife switch.

This simple and inexpensive arrangement is satisfactory for half-speed when men or supplies only are carried on the belt. The ohms and capacity of the resistor are designed for this light duty. If coal is carried at the slow speed, the increased load would further reduce the armature voltage and reduce the belt speed considerably, as well as overheat the resistor. Consequently, this method is recommended for carrying men and supplies only at the half speed.

The additional cost of the resistor and knife switch, for comparative purposes, would be approximately \$100.

2. Using two-speed gear transmission between motor and speed reducer, as shown in Fig. 5. Gearing is totally enclosed and runs in an oil bath. A flexible coupling is part of the transmission. The handle shown is thrown in one direction for half speed and in the other for high speed. The motor must be at rest before a change from one speed to the other is made.

This arrangement is very satis-

factory for hauling either coal or men and supplies at half speed. Obviously, it is not suitable for a quick change of speed where shuttle cars are used, because the motor has to come to a stop before gears can be changed.

Additional cost of the two-speed transmission is approximately \$850.

3. Using a variable-speed shunt-wound motor having a speed and horsepower range of 2:1. This, of course, also requires a suitable control for the two-speed motor.

Assume, for example, that a 30/15-hp variable-speed shunt-wound motor, 1750/875 rpm (corresponding to belt speed of 400/200 fpm) is used. Not only can belt speeds of 200 and 400 fpm be obtained, but also any speed between these two values. The control includes a rheostat connected in series with the shunt field. With the rheostat adjusted so that all resistance is in the circuit, the high speed of 400 fpm is obtained. With the resistor shorted out, the low speed is 200 fpm.

The rheostat can be adjusted so that the high motor speed can be any value from 200 to 400 fpm.

A vibrating, or fluttering-type, relay has its main contacts connected across the shunt-field-rheostat terminals. This relay has a series coil connected in series with the motor, a shunt-operating coil which aids the series coil magnetically, and a shunt-blowout coil.

During the accelerating period from rest to half speed, the shunt-operating coil is energized. This closes the relay contacts and short-circuits the shunt-field rheostat. Thus the motor starts with full field, which prevents flashing over at the commutator. This acceleration from rest to half speed is accomplished automatically by means of accelerating contactors.

The change from half to full speed, however, is made by weakening the shunt field. The second function of the fluttering relay is to provide smooth acceleration from half to full speed by changing the field strength gradually, as follows:

When half speed is reached, the shunt-operating coil is de-energized, the relay contacts open, and the rheostat is cut back in the shunt-field circuit, causing the motor to speed up. With the shunt coil no longer aiding the series coil, the relay will close if the armature current exceeds a certain value, say 125%, of full load, and will open if the current drops below a predetermined value, say full-load current. Thus the relay will flutter and alter-

nately cut the rheostat in and out of the shunt circuit as the armature current increases and decreases. The field current then decreases gradually, as the relay flutters, and the acceleration to full load is smooth.

For shuttle-car operation, a control switch is provided at the shuttle-car discharge station. With the switch closed, the shunt operating coil of the fluttering relay is energized and the belt is limited to half speed. When the shuttle-car operator opens the switch, the shunt coil is de-energized and the fluttering relay adjusts the field current so that the belt comes smoothly up to full speed.

A two-speed motor requires a large field frame and the control is more complicated. Consequently, this type of speed control is more expensive than other types. The additional cost of a 30/15 hp 1,750/875-rpm two-speed motor and control above the cost of a single-speed 30-hp 1,750-rpm motor with its control, for 230 v, is approximately \$1,200.

SURGE PROTECTION

Where a cross conveyor discharges onto a main belt spillage may occur when the main belt is heavily loaded. It is desirable to have provision for automatically stopping the cross conveyor when the main conveyor is heavily loaded, and for restarting it when the load becomes normal. A rotary-type switch, similar to those mentioned previously, except with normally closed contacts, can be used for this purpose.

The switch is mounted on the main belt conveyor, near the power unit of the cross belt, in such position that its roller makes contact with the belt only when the main belt is heavily loaded. The rotation of the shaft causes the normally closed contacts of the roller switch to open. These contacts are inserted in the control circuit of the cross-conveyor's magnetic starter. Thus, on heavy loads the contacts open and shut down the cross conveyor. For lighter loads the belt will not make contact with the roller. Consequently, the contacts close and the cross conveyor again loads coal on the main belt.

Special operating conditions will, of course, require more complicated controls than those discussed in this paper. It is realized, too, that there are many other electrical controls and methods which have not been discussed. However, for the majority of installations these simple arrangements should insure satisfactory belt-conveyor control.



MORE OPERATING TIME for stripping equipment and more-effective supervision are major radio benefits. At the right, Ralph Kehr, superintendent of stripping operations, demonstrates calling offices or mobile units, such as the Robin Hood dragline, from his car.

Better Stripping With Radio

Increased Operating Time for Equipment and Better Supervision Follow Radio Installation Serving Sherwood Strip Mines—Three Stripping Units, Two Supervisory Cars and Service Truck Included in the System

THE VALUE of better communication has been fully demonstrated as a result of initial experience with a new radio system serving the Indiana stripping operations of the Sherwood group, including the Sherwood-Templeton Coal Co. and



MAIN COMMUNICATIONS CENTER in the Linton headquarters, with Louise Peacock demonstrating, is in the reception room with switchboard and deluxe remote-control console. A second control console, similar to that in the Friar Tuck office, where R. G. Baughman, superintendent of plant operations, is using the mike, is in the office of the superintendent of stripping operations.



BASE OR LAND STATIONS include the Linton headquarters (left), Maid Marian mine and Robin Hood. Height of the antennas, on either self-supporting or guyed towers, was fixed from altimeter surveys to provide clear line-of-sight signal transmission.

the Central Indiana Coal Co., with operating headquarters at Linton and mines in Daviess and Sullivan counties.

Installed to permit instantaneous and dependable communication between mine and general offices, on the one hand, and stripping units, supervisory cars and service trucks on the other, the system has resulted in higher efficiency and lower cost for two major reasons:

1. Time lost by equipment in the pits has been substantially reduced because stripping units can report trouble immediately. Repair crews and facilities can be called to the scene at once if mechanical trouble is encountered, and the same is true of line crews and other service men if power or other difficulties are experienced. And if the work requires parts or materials not on hand at the spot, they can be obtained from storage with a minimum loss of time merely by picking up the microphone and calling, compared to the previous method of sending back a car or truck. Also, emergency orders for needed parts or materials can be radioed in to the main office and sent on immediately by telephone.

2. Supervisory efficiency has been materially improved by reducing the time previously required in merely getting over the ground. Now, much of the routine checking

on the progress of stripping operations, pit condition and the like can be handled by calling the operating units, thus cutting down supervisory driving hours and providing more time for study and planning. And if the superintendent of stripping operations (Ralph Kohr), the superintendent of plant operations (R. G. Baughman), or the chief electrician (Harry McGrew) want data on how things are going in the evening, on Sundays, and so on, they need only step out to their cars and start calling. Among the incidental benefits are savings in gasoline and wear and tear on cars, not to mention quick location of key men out on the job.

Base-Station Set-up—The Sherwood radio system, provided by Motorola, Inc., and installed under the supervision of Hubert E. Davis, Robin Hood mine electrician, operates from four base, or fixed, stations, three stripping units, three supervisory cars and one service truck. Operations served are:

Maid Marian stripping, in Daviess County, approximately 18 mi airline south of the Linton operating headquarters.

Friar Tuck stripping and Antioch power plant, in Sullivan County, approximately 8 mi northwest.

Robin Hood stripping, in Sullivan County, approximately 12 mi northwest.

Fixed, or land, transmitting and

receiving stations are as follows:

Linton operating headquarters with two remote-control points, one in the reception room where the telephone switchboard is located, and one in the office of the superintendent of stripping operations, Ralph Kohr.

Maid Marian preparation plant, with one remote-control point in the scale house 500 ft away.

Antioch power plant, with one remote-control point in the power-plant office, supplemented by sound-proof booth in the turbine room where attendants are present 24 hr per day, plus a second remote-control point in the Friar Tuck mine office 2,000 ft away (wire connection overland).

Robin Hood mine office, with one remote-control point in the office.

Transmitting and Receiving—Tower installations for transmitting and receiving are:

Linton office, guyed pole alongside with 20-ft steel extension, approximately 70 ft high to tip.

Maid Marian, 75-ft self-supporting "Windcharger" tower on northeast corner of preparation plant, approximately 125 ft high to tip.

Antioch power plant, 80-ft self-supporting "Windcharger" tower on top of boiler room, approximately 125 ft high to tip.

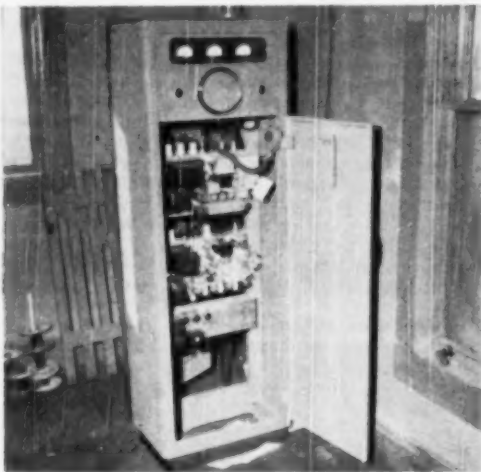
Robin Hood, 125-ft-high "Windcharger" guyed tower.

Height of the antenna towers

Radios for Stripping and Service Units Promote Efficiency



SIGNAL MONITORING AND CONTROL is the function of the deluxe remote-control centers, such as the Maid Marian unit (left, with T. J. Lankster, watchman, demonstrating), and the unit at Robin Hood shown with the cover raised. Speakers are mounted on the covers as at the upper right, Robin Hood.



FIXED OR BASE STATIONS include transmitter, receiver and auxiliary microphone in a single cabinet connected to the coaxial antenna. The unit at the left, with Clyde Rodocker, night boss, is at Maid Marian. The unit with the cover open is at Robin Hood.

was fixed by taking altimeter readings and then selecting the height so that the signals would clear the tops of the hills. On this line-of-sight basis, Robin Hood came out with the highest tower and Linton with the lowest. While this added to the efficiency of the system, hills have not interfered significantly with sending and receiving from cars and trucks on the roads. Some trouble has been encountered—and then only occasionally—when cars or trucks are down in the pits. Nor-

mally, the range of the car or truck outfits, when on hilltops, is 40 mi or more. The maximum airline distance from Maid Marian to Robin Hood is 30 mi, and all operations are within a circle with a radius of 20 mi.

Mobile Units—Mobile equipment included in the system is as follows:

Maid Marian—1150 B dragline.
Friar Tuck—750 B shovel.
Robin Hood—1150 B dragline.

Car—Ralph Kohr, superintendent of stripping operations.

Car—R. G. Baughman, superintendent of plant operations.

Car—Harry McGrew, chief electrician.

Truck—Line crew.

The Sherwood system is an F-M system operating on the frequency of 154.49 megacycles allotted to the open-cut mines of Indiana by the Federal Communications Commission. The frequency is in the 152- to 162-megacycle industrial frequency



TRANSMITTING AND RECEIVING UNITS for the car radios are mounted in the luggage compartment (shown here with covers removed). At the right is Hubert E. Davis, Robin Hood electrician, who installed the system.



STRIPPING RADIOS include this installation on the Robin Hood dragline, with Frank Persons demonstrating the hand mike while Urban Dixon keeps the overburden on the move.

band allotted to taxis and industrial short-range users. Sherwood transmitters and receivers include crystal control of the frequency, which is set at the factory and cannot be changed on the job. Input power ranges from 30 to 50 watts. For all but the car radios, the power supply is 110-v ac. Car units operate off the 6-v dc car system.

All messages are received by all stations—fixed and mobile—at all times. In other words, every call is audible at every station. To talk,

a button on the microphone is pressed; to receive, it is released.

Station Design—Base or land stations, in addition to the antenna towers, include the following equipment: "Compa-Station" transmitter-receiver in a single cabinet with auxiliary 6-in speaker and microphone connected to the coaxial antenna; deluxe remote-control console which monitors and controls the signals; speaker (usually 6 in); and dynamic microphone. At the

Linton headquarters and at Friar Tuck mine, smaller remote-control consoles without the monitoring equipment but with speaker and microphone are installed at key points—office of the superintendent of stripping operations and the Friar Tuck mine office.

Since the Antioch power-plant installation serves as a message center in off hours, special facilities were installed for receiving and transmitting communications. In addition to the deluxe console in the plant office and the smaller remote-control unit at the Friar Tuck office, a soundproof booth was installed in the turbine room, where men are on duty 24 hr a day. A 24-in high-capacity speaker also was installed over the remote-control station in the turbine room so that the men could hear calls over the turbine noise. The soundproof booth, also fitted with a telephone, makes it possible to answer in comfort without leaving the turbine room.

Mobile Equipment—Smaller receiver-transmitter sets with 6-in speakers and military-type hand microphones are used in shovel and dragline cabs. Antennas are connected with flexible coaxial cable. On the Maid Marian dragline, the antenna is on the mast, which puts it about 100 ft in the air. On the Robin Hood dragline, the antenna was mounted on the A-frame. It has been found, however, that in this position the height is insufficient, with the result that the signal is blanked out when the boom is between the antenna and the sending station. Consequently, the antenna will be moved to the mast.

Car and truck units consist of transmitter and receiver, hand mike, antenna, speaker, necessary fusing, and so on. "Off-on" switches and volume and squelch controls are included, but no tuning, since frequency is fixed. On cars, transmitting and receiving units are placed in the luggage compartment; on the line truck, in the secondary cab.

Usage—Since installation of the system, calls for equipment parts have turned out to be perhaps the most important traffic, followed closely by calls for maintenance, emergency help in breakdowns and restoration of power. Increased production time on stripping units, as well as better supervision and savings in gasoline and vehicle travel, are expected to return the cost of the installation in well under a year.



VERSATILITY AND DEPENDABILITY in ventilating a new mining area are benefits expected from this fan installation. Provision for adding a twin fan in the future is embodied in the design of the structure as shown at left.

Air for Anthracite

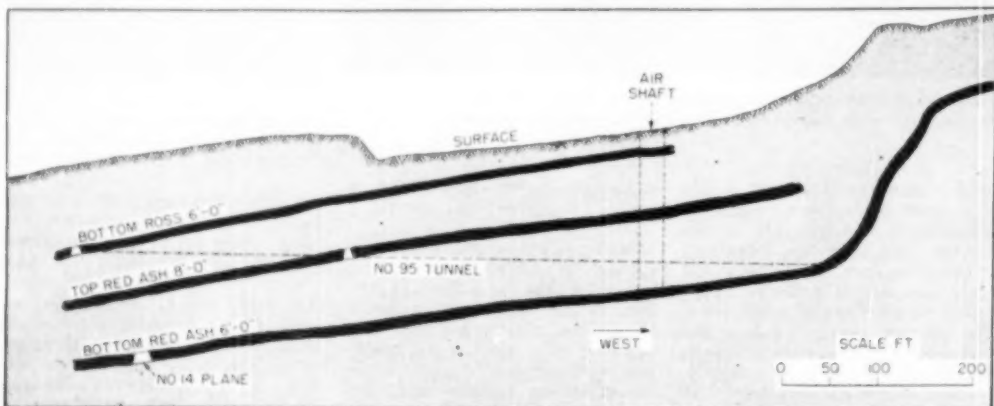
New Section at Glen Alden's Wanamie Colliery Ventilated by Variable-Pitch Fan on New Air Shaft — Pilot Borehole to Underground Opening Speeds Shaft Sinking — Concrete Shaft Collar Seats Fan Structure on Bedrock

TO PREPARE for developing and recovering approximately 9,000,000 tons of solid anthracite reserves in three veins, Glen Alden Coal Co.,

Wilkes-Barre, Pa., has installed a new ventilating fan and air shaft at Wanamie Colliery designed to operate efficiently at all air-demand

levels as the new workings develop. This colliery, in Newport Township, Luzerne County, is divided into two sections, No. 18 on the east and No. 19 on the west, each with an independent ventilating system.

The reserves are in the Bottom Ross, Top Red Ash and Bottom Red Ash veins in Wanamie No. 19. The capacity of the existing ventilating equipment was insufficient to supply the air that will be required in the new development, and officials of the company decided to sink the



SHAFT LOCATION, in relation to reserves in the beds to be mined, was selected to provide maximum ventilating efficiency and permit immediate use of the fan in developing the new sections. Rock tunnel and plane have been driven.

air shaft and provide a versatile fan to move additional air.

A 25-in pilot borehole, 170 ft in depth, was drilled from the surface to the top of the Bottom Red Ash opening as the first step in shaft construction. This borehole was expanded to 23x23-ft square cross-section to a depth of 32 ft. A 5-ft transition section changes the shaft to a circular bore 23 ft in diameter, this dimension being maintained through the next 4 ft of depth. Beyond this point, 41 ft from the surface, the shaft is 20 ft in diameter. These dimensions permitted installation of a concrete collar, as described later in this article.

Rock Dropped Down Shaft

Rock produced in expanding the borehole to shaft size was dropped down the hole to the Bottom Red Ash opening, where it was loaded onto a 90-ft chain conveyor discharging to mine cars on No. 14 Plane. This procedure eliminated any need for hoisting equipment at the shaft head. Loading was done during the off-shift to prevent interference with the operation of the plane on producing shifts.

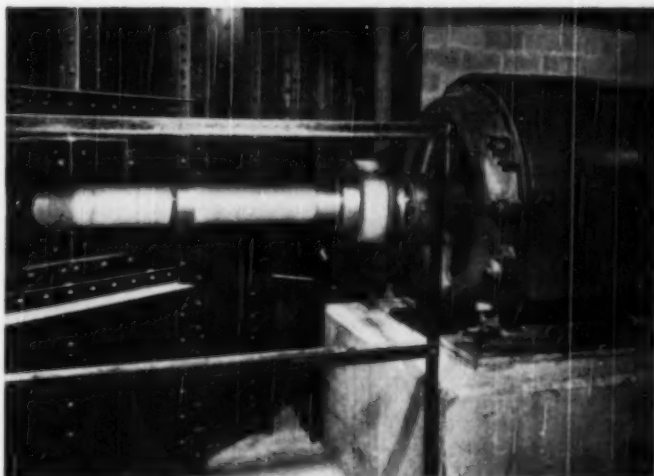
Successive cuts in the shaft were blasted by drilling 6-ft holes and charging these holes with Atlas 60% dynamite. Attempts to increase the depth of cut by longer drill holes resulted in blockage of the borehole.

A reinforced concrete collar 18 in thick supports the shaft to a depth of 41 ft through unconsolidated material and into the self-supporting rock below. The face of this concrete collar and the face of the self-supporting rock below the collar are flush, with the collar seated on an 18-in bench in the rock. Transmixed concrete in 1:2:4 proportion was used in pouring the collar. Reinforcement consists of 1-in and $\frac{5}{8}$ -in round rods placed as shown in the illustration.

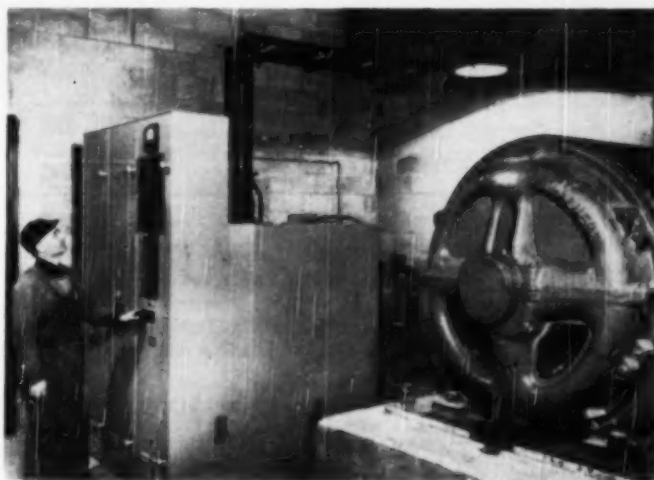
Shaft construction was begun in October, 1948, and completed in July, 1949.

Fan Output Variable

A Jeffrey 8H117 Aerodyne fan was chosen because adjustable blades permit variable fan output to match the changing equivalent orifice of the mine as the workings extend. The cast aluminum-alloy blades on this fan can be locked in any one of seven different positions, thus forcing movement of the desired quantity of air against the existing mine resistance. This fan,



FLOATING SHAFT and detail of flexible coupling linking drive motor to fan are shown here. Spare motor in fanhouse and chain hoist are available in emergencies.



AUTOMATIC SWITCHGEAR and recorders require only daily checks to keep fan functioning smoothly. Daily lubrication checks are also included in rigid maintenance program.

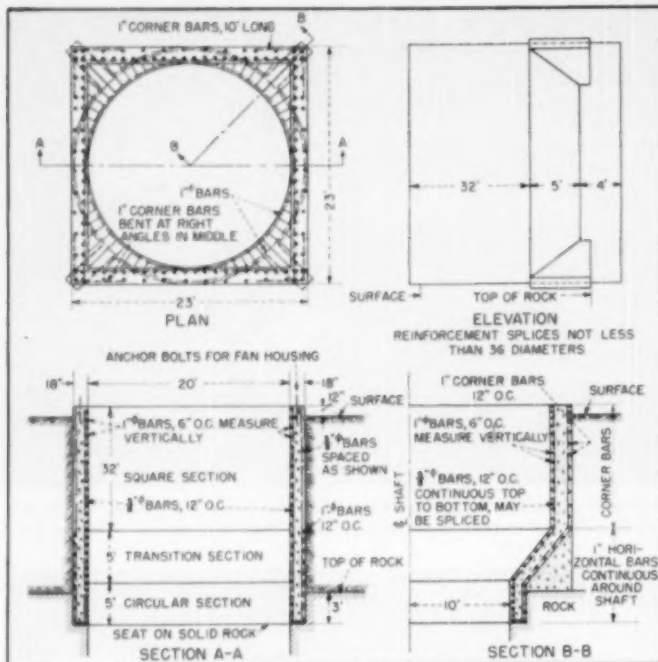
arranged for exhaust operation, will operate at an ultimate duty of 350,000 cfm at 4.5-in water gage in blade position No. 4. It was tied into the ventilating system of the mine in November, 1949.

This relation of controllable fan characteristics, depending on blade pitch, to changing mine characteristics is shown in the accompanying curves. Initial field tests of the fan indicate that mechanical efficiencies in the range of 75 to 80% will be obtained, based on the ratio of air horsepower to brake horsepower of the drive motor.

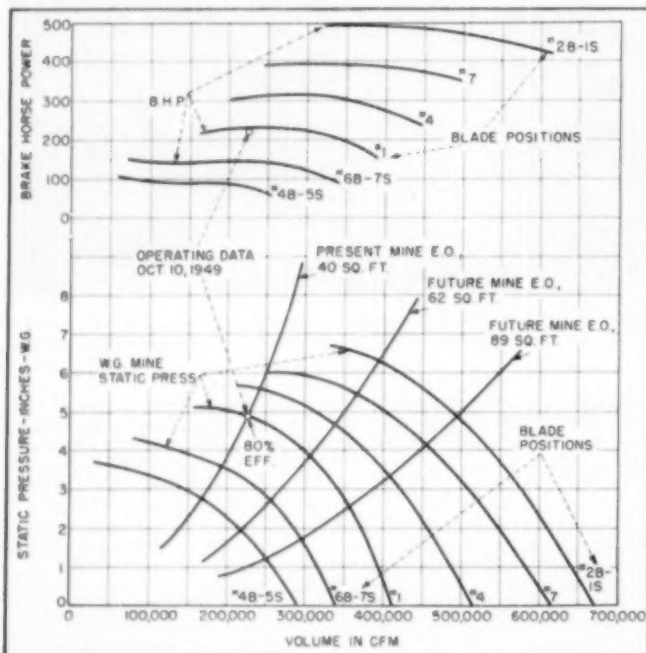
The fan is direct-driven at 580 rpm through a floating shaft with flexible couplings by a 350-hp three-phase 60-cycle Allis-Chalmers induction motor operating on 2,300 v. This drive will carry the fan at any of the blade settings up to position No. 5 without overloading. Immediate advantage of the installation was obtained because the three veins are open to the shaft.

Power for the installation is purchased from Luzerne Gas & Electric Co. and is transmitted from the utility company's mains to the fan site at 13,200 v over an 8,000-ft

Variable-Pitch Fan in New Shaft Provides Air at Wanamie Mine



SHAFT-HEAD SUPPORT is afforded by the collar shown. Good design and adequate reinforcement anchor the fan to bedrock to insure long-term, trouble-free operation.



MINE AND FAN MATING is indicated by these mine and fan characteristics. Changing blade-pitch adapts the fan to new duty requirements as the mine develops.

pole line erected by Glen Alden. This line is the primary line in carrying power to the fan and is supplemented by an additional line that serves other loads in the area. Potential in these supply lines is stepped down to 2,300 v in a substation adjacent to the fanhouse.

Standby Line Brought In

In the event of trouble on the primary line, automatic switching to the standby line is accomplished by controls on General Electric Type FLO oil circuit breakers. When the fault clears, the return to the primary line as the source of power is also automatic. Manual controls and a lockout feature on the automatic switching equipment are installed for use when maintenance on one line requires that the load be kept on the other line for an indefinite period. Metal-Clad switchgear on the secondary side of the transformers is designed to effect line-starting of the drive motor.

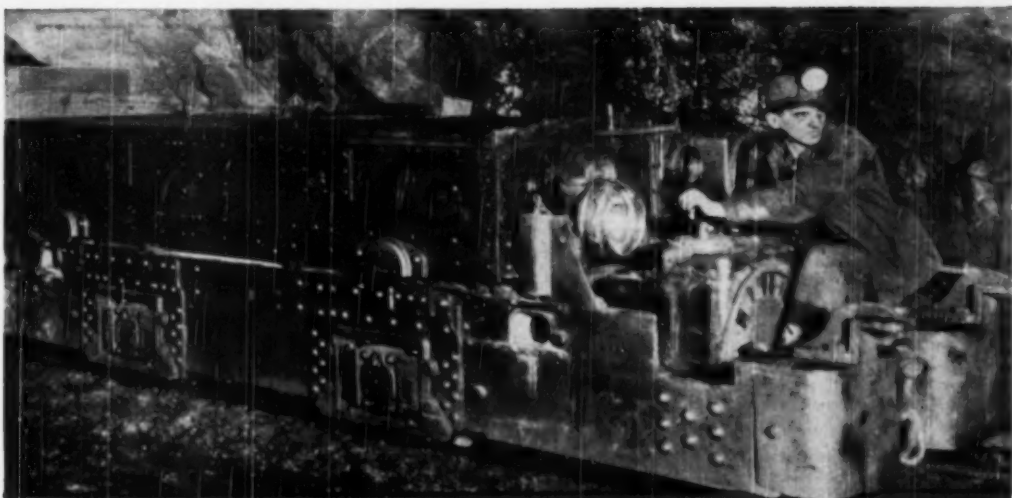
Preventive maintenance is handled by one man, who visits the fan-house daily to check oil levels in the lubricators, record bearing temperatures, file pressure records from the automatic continuous recorder, and record current readings as an indication of motor and fan loads. He enters such information in a log book kept in the fanhouse. A spare drive motor is stored in the fanhouse and a chain hoist is permanently installed to facilitate motor replacement.

Lubrication Needs Met

Lubrication of the heavy-duty SKF roller bearings on which the fan is mounted is done by balanced-pressure oil applicators to prevent the airstream sucking oil out of the bearings. In this installation the oil reservoir is mounted outside the fan duct, and oil-feed and balance-pressure lines lead from this reservoir to the bearings on the fan shaft.

The complete installation is designed to permit addition of another fan in the future with a minimum of new construction.

Planning and supervision of shaft construction was in charge of F. E. Kudlich, chief mining engineer, assisted by J. J. Donne, division engineer. Electrical engineering was done by F. C. Nicholson, Glen Alden's chief electrical engineer, assisted by W. T. Joseph. H. E. Pearce is colliery superintendent at Wanamie.



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You get the kind of power with Exide-Ironclad Batteries which assures safe, flexible haulage operations . . . quick car changes . . . fast movements with fully loaded cars. Exide-Ironclad power is lasting power too . . . which keeps locomotives, trammers and shuttle cars working at steady, uniform speeds throughout the entire work shift. Moreover, power from Exide-Ironclad Batteries is dependable power, free from troubles which cause unscheduled periods of down-time for minor repairs which result in lower production per man, per shift.

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The Safety Goal for 1950

In the latest of his monthly letters to mine inspectors, officials and miners on safety problems and progress, J. J. Walsh, deputy secretary of mines for Pennsylvania, sets a safety goal for 1950 and summarizes the means of achieving it. In the belief that Mr. Walsh's conclusions, particularly as to the job of supervisor, are applicable beyond the anthracite industry Coal Age reprints his letter below:

WHAT I AM GOING to ask of each and every operator in the anthracite region in this brief message is something that is simple and easy to do. In fact, the task I am about to assign you ought to be so pleasant that not one of you should restrain himself in hastening to do his full part to comply with my request.

A comprehensive study of the records of fatalities occurring in the anthracite mines over a long period of years clearly reveals that the lowest irreducible fatality rate per million man-hours is 0.16. To acquire this rate, the anthracite industry would have to perform perfectly, without any carelessness or mistakes in judgment. This we concede is almost too much to expect from the industry as a unit.

Therefore, making due and proper allowance for our imperfections, starting with the new year, you are especially urged to make 1950 the occasion—where it has not already begun—for the establishment of a fatality rate of 0.50 or better. Right here, let me suggest that you do not waste time arguing that it cannot be done because of the human element with which you must deal. It is true that people are influenced by various things which interfere with their following safe practices. The fact that not everybody practices safety is no argument against the need for stepping up supervision, and do not overlook the fact that space between 0.16, the irreducible minimum, and 0.50, the goal set for 1950, is sufficiently ample to absorb a lot of human carelessness.

If, at the end of 1950, it is found that the industry's rate is 0.50, you can claim an efficiency performance of not more than 32%. This, certainly, is not asking too much.

The purpose of supervision is to compel men who persist in being negligent to do that which the law directs they shall do. Merely telling a man

to be careful will not guarantee that he will be so. For instance, everybody wants to avoid injury, yet, although they know it to be a fact that certain habits and practices have caused dreadful injuries, that does not prevent them from indulging in these habits and practices. The fact, therefore, that not everybody practices safety is no argument that the toll of human life cannot be reduced.

The mining industry employs a large number of splendid officials and miners—capable men—who have given outstanding service in their profession. The fear of death, the threat of bodily harm or the strain of exertion does not stay them. They take the mining risk, and every year some heroes among them perish.

In this new year which we are about to start, with the eyes of the nation's coal industry focused upon you, would it not be a wonderful tribute if every official and every miner contributed his small effort to face safety.

What I say here may well be read and pondered by the executive officials

of all coal companies, those in immediate charge on behalf of the owner, because without their wholehearted support and direction, the success of our undertaking will be less simple.

This is a task which is vast in scope and in which no one can withhold his readiness and willingness to cooperate and escape detection. After all, we cannot hope in this life to achieve success free from combat. This is our testing ground. We have a prize to win and we must fight for it. Some of you—not many I am sure—after reading this appeal for more and better supervision in the region of the working face, may be inclined to dismiss the whole matter with the feeling that because you pay no attention to the idea, no one else will. Just how wrong these few can be is demonstrated by the fact that, combined, 92% of the coal companies in the anthracite region have, during different yearly periods, established, as a result of improved face supervision, a fatality rate of 0.50 or better. I shall now leave the matter in your hands, with one final thought: Always remember that no man need worry much about what is ahead of him if he has a good background behind him.

How Insulation Maintenance Helps Equipment Performance

ELECTRIFICATION of mining operations has become almost universal within recent years because the economy inherent in electric power dictates its use in preference to other power-producing media. This conversion to electricity has introduced some problems, not the least of which are the danger and inconvenience of damaged or inadequate insulation on electric equipment.

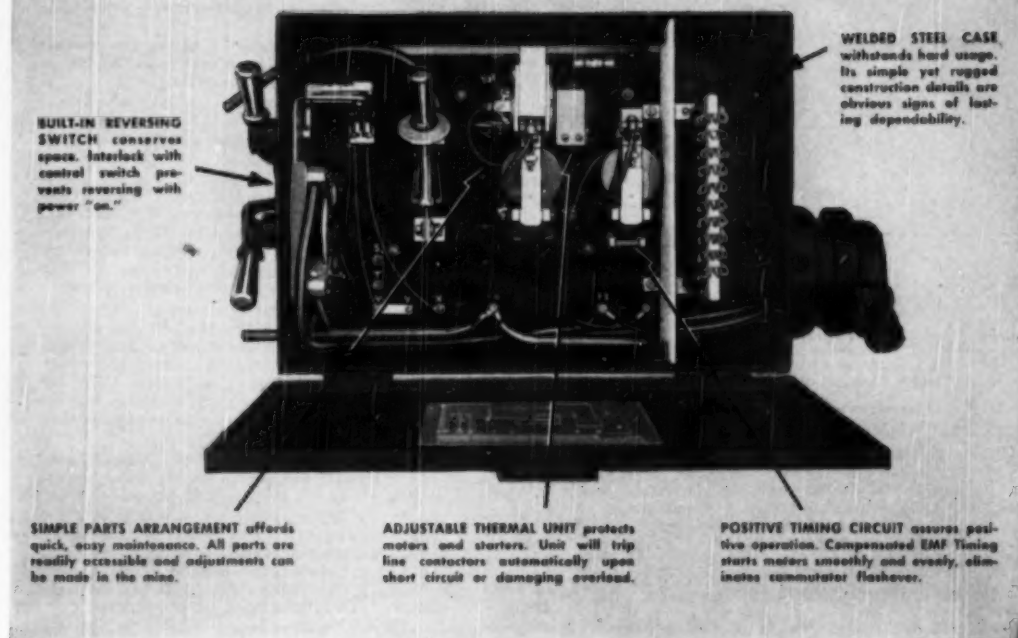
An insulator is a non-conductor used to confine electrical energy to a definite path—the conductor that the insulation surrounds. Any strain produced by the energy in the conductor, in its attempt to follow the path of least resistance to ground, is concentrated in the insulation. If the insulation is inadequate for the job, it breaks down and no longer serves to confine the energy. The ultimate danger, in the event of such failure, is the possibility of a workman's body supplying the shortest path to ground if he

contacts the conductor at the point of broken insulation. Also, short-circuiting of current as a result of an insulation failure between conductors will prevent operation of all equipment depending on that current. Insulation, then, is one of the controlling factors in safe and uninterrupted electric service, and should be installed and maintained with care.

Insulation must meet certain specifications and possess certain properties if it is to perform its confining function satisfactorily. It must have high dielectric strength, meaning ability to withstand great electrical stress without puncturing. It must also have sufficient mechanical strength to meet the conditions to be encountered in service. Certain applications may require special properties, such as, flexibility, moisture resistance, chemical stability and abrasion resistance.

Physical characteristics of the insulation, controlled during manufac-

More for your money...



BUILT-IN REVERSING SWITCH conserves space. Interlock with control switch prevents reversing with power "on."

WELDED STEEL CASE withstands hard usage. Its simple yet rugged construction details are obvious signs of lasting dependability.

SIMPLE PARTS ARRANGEMENT affords quick, easy maintenance. All parts are readily accessible and adjustments can be made in the mine.

ADJUSTABLE THERMAL UNIT protects motors and starters. Unit will trip line contactors automatically upon short circuit or damaging overload.

POSITIVE TIMING CIRCUIT assures positive operation. Compensated EMF Timing starts motors smoothly and evenly, eliminates commutator flashover.

O-B MOTOR STARTERS *are built for hard mine usage...*

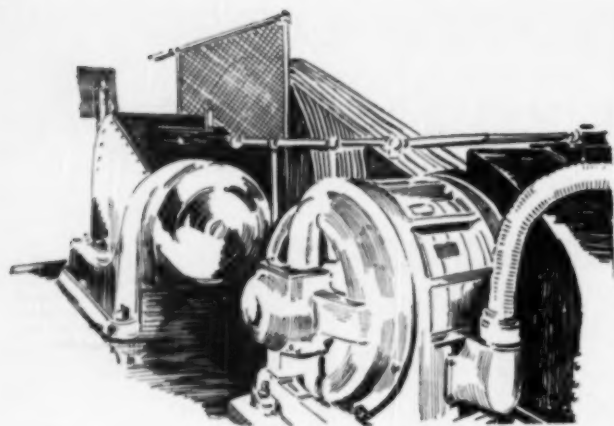
Control equipment dollars go farther when they are invested in O-B Automatic Motor Starters. Not that the initial cost is less . . . but they last longer, require less maintenance and operate with less supervision than other similar equipment. A glance at the case and the inside of the O-B

Starter shown here tells the reasons why . . . You can get the benefit of these dollar-saving advantages by specifying O-B Starters on your next equipment order. They are available for either gas-free or gaseous service.

2015-A

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MANSFIELD, OHIO
Canadian Ohio Brass Company, Limited
Niagara Falls, Ontario



Insulating Materials and Standards

Class	Description of Material	Limiting Value, Deg C	Limiting Rise, Deg C
O.....	Unimpregnated cotton, rayon, nylon, paper and similar organic materials.....	90	50
A.....	Impregnated cotton, rayon, nylon, paper and similar materials.....	105	65
B.....	Mica, asbestos, fiber glass and similar inorganic material in built-up form combined with a binding cement. This cement must not reduce the ability of the insulation to withstand continuous temperatures assigned to this class.....	130	90
C.....	Inorganic materials, such as pure mica, porcelain, quartz, etc.	No limit selected	No limit selected
H.....	Mica, asbestos, fiber glass, etc., in built-up form using silicone binders; or silicone compounds in rubbery or resinous form....	180	140

ture, are highly important. Quality must be uniform so that insulation will meet its guarantee and give predicted service. Short air gaps and other design limitations on equipment size require that the thickness of insulating materials be maintained within close tolerances. This strict control of the manufacturing processes indicates that insulation is a precision-built material and therefore should be handled and applied with care.

Insulators are classified according to the materials used in their manufacture. Considering insulation for rotating apparatus only, these materials would include paper, cotton, rayon, nylon, mica, asbestos, fiber glass and the various resins and varnishes applied to these base materials or used alone. It is characteristic of these materials that while they refuse to conduct electricity, they also refuse to conduct heat to any appreciable extent.

This poor heat conductivity has always hindered equipment designers in their efforts to put higher working

capacity into machines of given size. Continuous operation at excessively high temperatures bakes the insulation to brittleness, and mechanical forces in rotating equipment then cause its disintegration. There is a bright spot in the picture however. Research in the field has led to the development of inorganic materials called silicones, which are silicon-hydrogen-oxygen compounds capable of operating at high temperatures for long periods without deteriorating.

The importance of this discovery is apparent when it is considered that the rating of motors and generators is based entirely on the ability of their insulation to withstand the damaging effects of heat. This system of rating is outlined in the accompanying table. Limiting value in the table is the "hottest spot" in the windings or laminated parts of the equipment as determined by experiment on representative machines. The limiting rise is the allowable temperature increase that the corresponding class of insulation can tolerate in continuous op-

eration. In all cases an ambient temperature of 40 deg C is assumed.

Hottest-spot temperatures shown in the table are considered to be 15 deg C higher than the temperature at the hottest part of the machine accessible to mercury thermometers.

This system of rating indicates that satisfactory machine service depends on the condition of the insulation to a great extent. Good maintenance and sensible application of the equipment will keep the insulation in dependable condition.

Here are some of the factors that should be considered in an insulation-maintenance program:

1. Check the machine to be sure that all ventilation paths are open. Don't let coal or dust accumulate in such quantity that the flow of air will be restricted. Remember that the life of insulation depends on the temperature in which it operates and that poor ventilation may result in excessive heat. Have the machine cleaned as often as possible to remove dust, dirt, oil, grease and other accumulations.

2. Insulating materials are moisture repellent to varying degrees and are not strictly waterproof. Good preventive maintenance consists of protecting the equipment from drip and splash water. Damp materials will not insulate. The machine must be kept as dry as possible.

3. Most organic materials are subject to chemical attack under the influence of moisture, oxygen and corrosive agents. All these agents are present in coal mines and atmospheric conditions are such as to promote such attack. This chemical effect supports the need for cleanliness and for moisture guards on mine equipment.

4. Mechanical defects in the machine may result in electrical failure. For example, a worn shaft bearing may cause the rotating armature to rub the field assembly. The resulting damage will necessitate a complete overhaul to return the machine to service. Check the mechanical features of the machine, giving special attention to bearings and commutating system.

5. Make a practice of checking temperatures on external parts by hand. You may detect incipient troubles before major damage is done. This will take practice and experience, but if you cut repair costs to any extent it is worth your time and effort.

6. The characteristic odor of burning insulation is one of the first signals of electrical trouble in the making. Learn to detect it, and then stop the machine, if possible, until the trouble is located.

These are electrical maintenance checks that every production supervisor can make to increase insulation life and, thus, add years to motor life. The equipment can give rated service only if it is maintained properly, and everyone in the mine should assume some responsibility for this maintenance. Form the habits and practice them daily.

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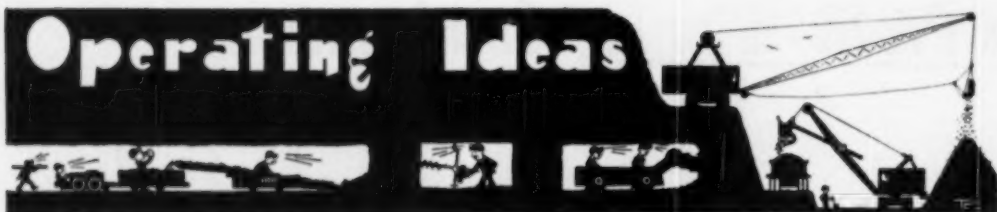
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Mack Trucks, Inc., Empire State Building, New York 2, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities, for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Operating Ideas



Grease Truck Cuts Maintenance and Lubricant Requirements

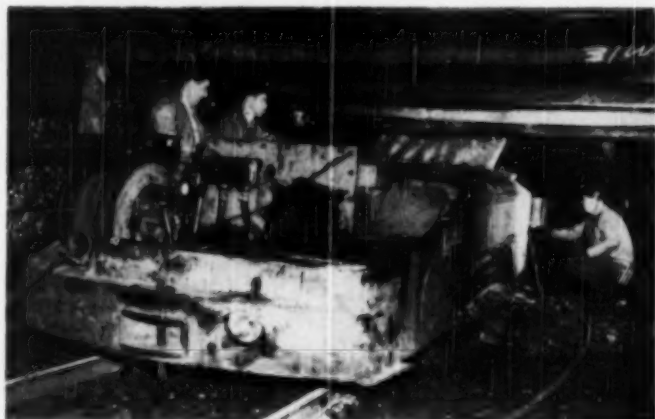
MAINTENANCE of loading machines and cutters was put on the skids at the Bunker mine of the Trotter Coal Co. by installing a Lee-Norse grease truck. In the first 18 months the truck was used to grease the eight 14BU loaders and nine 7AU universal cutters, the 17 face machines suffered only three bearing failures. The savings in quantities of lubricants consumed totalled 65% and the fewer breakdowns effected additional savings, some of which are intangible.

The mine, located at Casaville, Monongalia County, W. Va., operates two tippie shifts and produces 4,000 tons of picked and air-cleaned coal daily from the 66-in Sewickley seam. Seven loading crews work on each shift. Loading machines discharge directly into 8-ton cars of the 8-wheeled type. The main portal is a slope which was recently modernized by installing a rotary dump underground and a belt conveyor to replace hoisting cars up the slope.

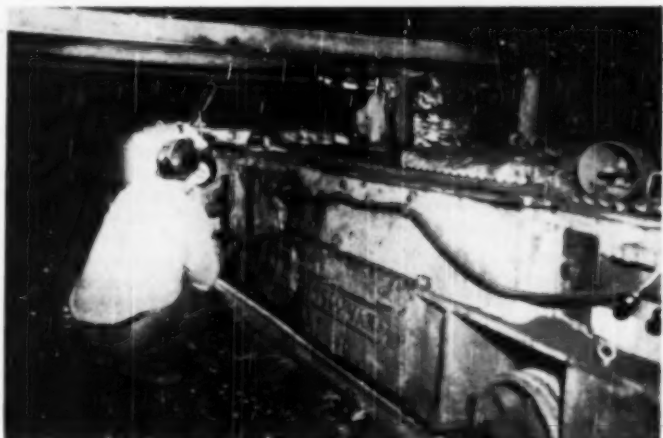
The grease truck is a self-propelling trolley-and-cable unit rated 6 to 8 mph. Motors and controllers are of explosion-tested type. Three tank compartments, each holding 2 bbl, accommodate the oil, transmission lubricant and chassis lubricant. Over-all dimensions of the grease truck are: length, 13 ft; width, 6 ft; and height above the rail, 37 in. Grease and pressure guns are air-operated. A front compartment housing pumps, meters and three hoses with hand nozzles has a hinged door on the top, which is opened for greasing and is kept closed at other times to exclude dirt.

Every three or four shifts, the grease truck is taken to an oil-storage room at the bottom of the slope where the grease compartments are refilled by barrel transfer pumps operated by air supplied from the grease-truck compressor. A two-man crew operates the grease truck and the work is done on an off shift. Every sitting on a machine must be able to take and retain grease or it is replaced. Any unusual consumption of grease on a machine is checked for cause and if an extensive repair job is indicated, it is noted on the daily greasing report. The report includes serial numbers of the machines and the quantities of lubricants used on each.

For two months prior to installation of the grease truck, a total of 10,707



GREASE TRUCK shown in use at the Trotter Coal Co. has reduced bearing failures and cut lubricant consumption 65%. The two men at the right constitute the crew and looking on are L. A. Connor (left), ass't supt., and J. Snyder, section foreman.



GREASING A UNIVERSAL CUTTER with the trolley-and-cable-powered grease truck. The raised lid in the background is opened to expose the grease-truck front compartment containing pumps and meters and storage space for hose when not in use.

gal of oil and grease was used in the mine. During the first two months the truck was in use the total consumption was 3,658 gal. Although

grease is measured in pounds, the consumption was reduced to gallons so that it could be added to the oil, which is measured in gallons.

Memo from our RAW MATERIALS DEPT.

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION OFFICE MEMORANDUM

DATE 8/11/49

TO: Metallurgical Dep't.

SUBJECT: Performance of Heat Treated JALLOY Steel
at Benson Mines, Star Lake, N. Y.

1" x 6" heat-treated JALLOY #3 flats to reinforce truck-body bottoms and doors. Service—severe impact loading of hard rock magnetite ore from 5-yd. shovel. Year round operations in temperatures to minus 47°F. Severe abrasion in unloading. Installations have been in service 13 months—305,000 tons handled per truck. Units equipped with these flats maintain bottom flatness and clean readily. Insignificant wear at this date indicates at least 2 years life before replacement is necessary.

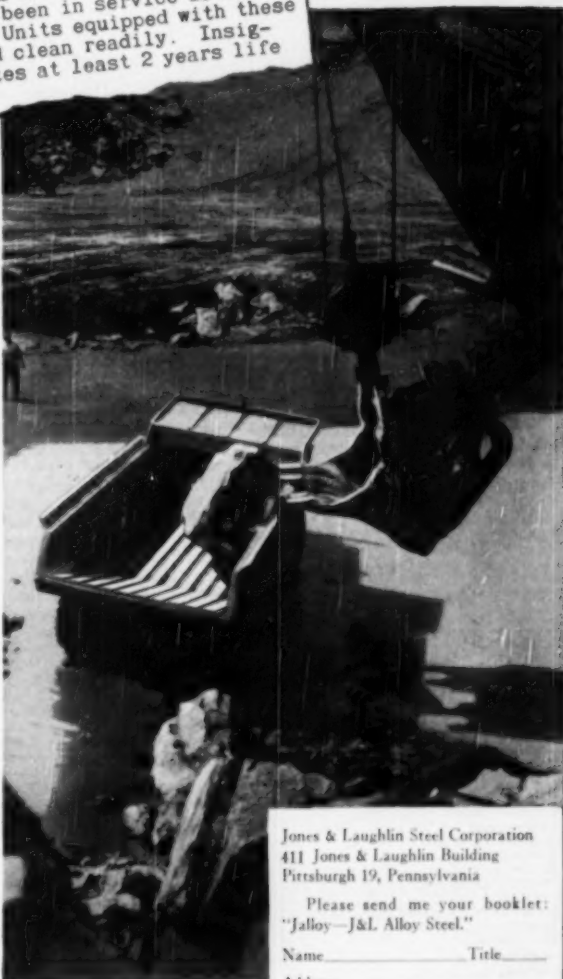
WHAT better "laboratory" could we find to prove the qualities of J&L Steel than in the equipment required in our own operations?

The handling and moving of heavy, abrasive ore-bearing rock, at our Benson Mines, is a rugged test for any equipment. Yet our stone trucks equipped with heat-treated J&L JALLOY Steel reinforcing strips have run more than a year without bottom replacements. And recent reports indicate at least two years life!

These JALLOY strips receive the full impact of huge rocks dropped into the truck bodies, and withstand the abrasion caused by dumping load after load. This continuous resistance to shock is particularly noteworthy because of the embrittling effect of the sub-zero temperatures encountered during winter months.

J&L JALLOY is a fine-grain, heat-treated steel made in a wide range of physical properties with tensile strengths of 155,000 to 180,000 lbs. per sq. inch. Its inherent ability to withstand shock and abrasion adds life to equipment that must be tough and strong—such as: Rock crushers, Scrapers, Bulldozers, Dump cars, Power-shovel buckets, Truck bodies, Sandblasting equipment—or wherever abrasion and impact are limiting factors.

Manufacturers of trucks and trailers designed for heavy service will find JALLOY an excellent material for body bottoms, reinforcing strips exposed to severe abrasion, tail gates and many other applications. You'll find that JALLOY is a steel that stands up when the going gets tough. For more complete information, let us send you the booklet: "Jalloy—J&L Alloy Steel." It includes data on properties, heat treatments and workability. The coupon at the right is for your convenience.

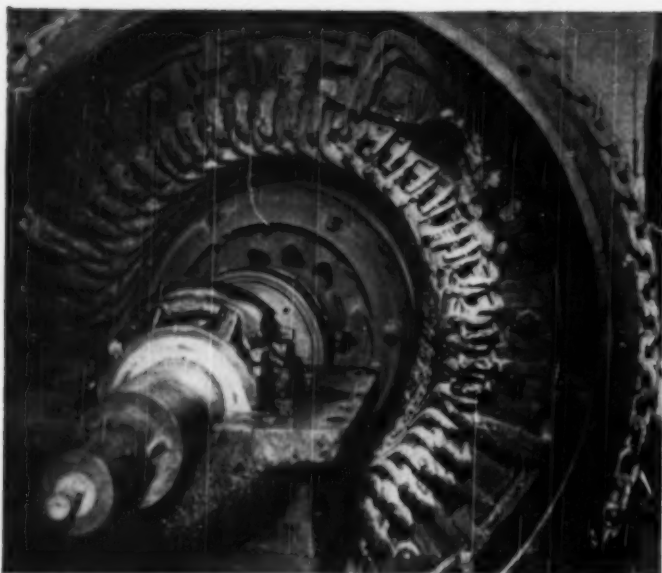


Jones & Laughlin Steel Corporation
411 Jones & Laughlin Building
Pittsburgh 19, Pennsylvania

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JONES & LAUGHLIN STEEL CORPORATION



POOR MAINTENANCE and improper operation show up in costly outages of electric equipment that can stop productive machinery and add considerably to over-all costs.

Causes of Electrical-Equipment Failures

UNINTERRUPTED PRODUCTION is perhaps as important today as it has been at any time in the past, with the exception, of course, of the war-time periods and their urgent requirements. Labor costs are higher than ever before and in many instances constitute a large percentage of the total overall costs of operation. The importance of holding certain markets

through ability to supply them adequately also is an important factor today. And in connection with all of this, proper maintenance of electrical equipment is essential.

The figures shown in the accompanying table are based on a study of over 1,200 failures of electrical equipment during 1947 investigated by the Hartford Steam Boiler Inspection & Insurance Co. The data were obtained from studies of accidents made at the scene as soon as possible after each failure. All investigations were made by men especially trained for such work, and each report was sub-

Adapted from "Maintenance of Electrical Equipment," by George I. Pierce, engineer, electrical division, The Hartford Steam Boiler Inspection & Insurance Co., and reprinted from *Maintenance News*, Westinghouse Electric Corp.

Electrical Equipment Failures*

Major Causes	Generators, AC & DC (Except Turbine-Driven)	Synchronous Motors and Condensers	AC & DC Motors	Transformers	Switchboards
Lightning	13.3%	11.8%	1.9%	32.4%	33.1%
Deterioration of insulation	20.7%	23.5%	10.5%	18.5%	.....
Foreign material on windings .....	.....	17.6%	7.2%	.....	.....
Undetermined .....	.....	5.9%	.....	18.4%	13.8%
Defective material	5.7%	.....	.....	.....	.....
Overload	1.7%	9.8%	9.5%	.....	.....
Excessive moisture	7.6%	.....	5.9%	.....	.....
Poor workmanship .....	.....	7.0%	5.5%	9.2%	.....
Single-phase operation .....	.....	.....	4.6%	.....	.....
Insulating oil contaminated .....	.....	.....	.....	6.2%	.....
Lubrication .....	.....	.....	12.2%	.....	.....
Poor contact .....	.....	.....	.....	.....	12.3%

*These percentages are for the major causes of failure for each particular classification of equipment, those failures constituting at least 5% of the total, and the columns therefore do not total 100%.

sequently studied and verified by a committee of electrical engineers in the company's home office.

Let us review the data shown in the table with the thought in mind that the frequency of certain types of failures can be greatly reduced and, in other cases, the cause can be eliminated entirely.

Lightning

A record of electrical failure caused by lightning has been maintained by the company for many years, and it is encouraging to note substantial progress over the years in the elimination of accidents from this cause. However, as shown in the table, this type of failure still accounts for a substantial percentage of the total, and it is believed that steps can be taken to improve this record. It is generally conceded that each installation must be individually engineered. The larger manufacturers today have specialists who have made detailed studies of the problems involved. They have found that there is "no cure-all" that can be generally applied but rather that a careful study of existing conditions at each location must be made. Furthermore, the solution of troubles resulting from lightning ordinarily should be placed in the hands of specialists. Once suitable equipment is installed, however, it must not be neglected. It is vitally important, of course, to maintain ohmic resistance as low as possible on all lightning-arrester grounds.

Insulation generally fails as a result of mechanical breakdown rather than electrical. Many failures can be prevented by thorough examination of the condition of windings by men who are trained to know the weak points and who can recognize the symptoms of impending failure.

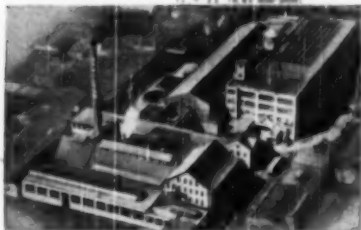
The importance of recognizing the early indications of deteriorated insulation prior to the actual failure cannot be overemphasized. Management should adopt an inspection program that will forewarn of an impending failure of a machine, with its resulting possible serious effects on production. Neglect of this may lead to shutdowns of vital equipment.

Foreign Material

Foreign material on windings caused many failures that proper maintenance would have prevented and it is believed that such shutdowns should be regarded as inexcusable. Accumulations of cement, dust, carbon black, flour, lint, oil, grease or other substances can be prevented by cleaning at regular intervals. Where this will not suffice, either totally enclosed motors should be used or enclosures provided, together with a proper supply of clean cooling air. Isolation in pressurized rooms sometimes is required in extreme cases. More frequently, however, the trouble can be corrected at the source.

Overloading losses can be reduced,

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Since its beginning, Hamilton has enjoyed the patronage of a wide segment of industry. For this we are proud, and because of this, we are able to celebrate our 80th Anniversary.

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if not entirely eliminated, by insisting that nameplate current values not be exceeded. It must be kept in mind that the heating varies as the square of the current. Thus, even small increases in ampere loads mean relatively large increases in heating. Today, it is a generally accepted rule that for the types of insulation most frequently used, the life is halved for every 7- to 10-deg C increase in temperature.

Excessive Moisture

Most of the failures from excessive moisture referred to in the table were caused by permitting the equipment to stand idle for a sufficient time to

absorb moisture. The best means of prevention is to maintain the temperature of the idle equipment at a few degrees above ambient temperature by using space heaters, thus eliminating the possibility of moisture condensing on the windings. In some cases, electric light bulbs will supply sufficient heat if the equipment is covered with a tarpaulin vented at the top to permit circulation of the heated air.

Many losses from poor workmanship are a direct result of the war-inspired emphasis on quantity production. Such losses should decrease with the generally improving conditions in the manufacturers' plants and in those of the ultimate users of the

electrical equipment. Better supervision and proper training programs also will help.

Single-Phase Operation

It would seem that losses from single-phase operation could be reduced. Most of these failures followed the blowing of a fuse or the opening of one phase of an outside power supply. In some of these instances, thermal relays used had ratings too high for proper protection of the equipment. Furthermore, there were far too many failures, particularly with smaller sized motors, where thermal relays of the proper rating simply failed to function.

Corn Cobs Dry-Clean Electrical Apparatus

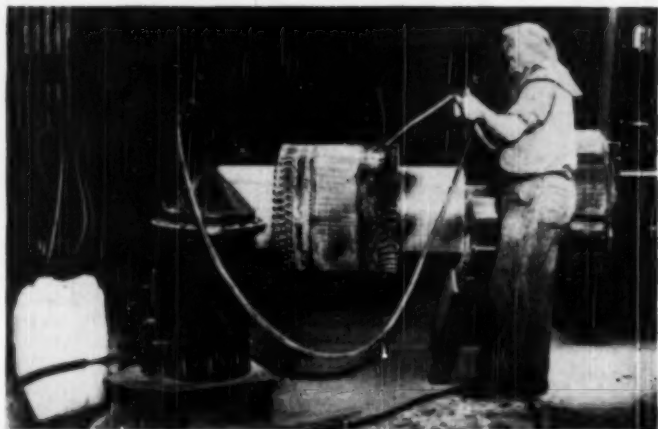
A NEW METHOD of cleaning electrical apparatus, which for efficiency and economy has proved far superior to the old established methods, has been developed by the Gary Sheet and Tin Mill electric shop, which is seeking patent protection on the procedure.

The use of vegetable substances, such as corn meal, bran and hominy grits, directed under pressure at such equipment as motors, coils, transformers, etc., has been found to produce not only the "new look" but also new results. First experiments with these materials tended to prove ordinary corn meal the best for the purpose, but further experimentation has shown that finely ground corn cobs are greatly superior. Cost is approximately 25% of the cost of corn meal. Other substances whose particles have the ability to envelop themselves with a thin film of liquid or dirt can no doubt be applied with equally successful results.

Using a conventional syphoning arrangement, the granulated corn-cob material is introduced into the air stream (at about 30-lb pressure) and then thoroughly blown through all the openings of the armature windings and commutator assembly. By regulating the air pressure and the quantity of granulated corn cobs used, the operator is able to provide and direct the cleaning medium in properly related quantities to efficiently clean the surface.

After the apparatus is thoroughly cleaned in this manner, it is then blown out, with air only, to remove partially lodged particles. The apparatus will present an almost new appearance with shiny lustrous surfaces. In addition, all the exposed surfaces are absolutely dry so that it is possible to reassemble the apparatus and immediately put it in service.

In conventional practice, cleaning



GRANULATED CORN COBS blown under pressure into this rotor clean it more effectively than by conventional methods, and at considerably lower cost. After the process is completed, the unit may be immediately reassembled and put back into service.

with compressed air only is the most common method employed, especially on large apparatus. Care must be exercised, however, that pressures are not too great or binding tapes, etc., may be loosened and dirt be blown in under them. Another objectionable feature to this method is that dirt blown out of a machine may be drawn into others nearby.

For accumulations of dirt containing oil or grease, a liquid solvent frequently is sprayed under pressure onto the equipment. Great care must be exercised in using such solvents, as they are usually flammable, quite frequently toxic and in some instances, explosive.

In extremely hazardous locations, it has usually been the practice to use straight carbon tetrachloride, but with its use careful consideration must be given to its toxic effects. The vapor produced, though not flammable, is heavier than air and may accumulate

in pits or confined spaces, with dire results to the workmen.

When cleaning with liquid solvents, it has been found that in addition to the drying period required, dirt will be flushed into nooks and crevices of the equipment and remain there after drying or evaporation of the solvent. Also, a thin film of residual matter remains on the cleaned surfaces, preventing adherence of insulating mediums such as paint or varnish. These conditions, together with the deleterious effect on the insulating medium created by the protracted use of liquid solvents, frequently results in grounding of the electrical equipment or short-circuiting.

The Gary Sheet and Tin Mill's method of dry-cleaning electrical apparatus eliminates such objections. In addition, the degree of cleanness attained far exceeds that obtained by other usual methods, and at a considerably lower cost.

Adapted from "Dry Cleaning With Corn Cobs," by Ed. Shoff, Carnegie-Illinois Steel Co., Gary, Ind., and reprinted from *Maintenance News*, Westinghouse Electric Corp.



8 YEARS' SERVICE SHOWS HOW MUCH BETTER COR-TEN CARS RESIST CORROSION. The high sulphur content of the coal in this mine played havoc with mild steel cars here. Bottoms and lower part of sides had to be practically renewed while U.S.S. COR-TEN cars in the same mine, and used for the same period, show very little corrosion and are good for ten more years' service.



U-S-S COR-TEN CAR

See for yourself WHY IT PAYS TO BUILD MINE CARS WITH U-S-S COR-TEN

THE photographs shown here illustrate clearly why the more than 21,000 Cor-Ten mine cars now in operation are paying for themselves, and why 53% of these cars were built on repeat orders. It is the proved ability of Cor-Ten to prolong car life that makes Cor-Ten construction such a sound investment.

Because U-S-S Cor-Ten is nearly twice as strong as an open hearth structural steel and has greater resistance to impact, shock, abrasion and wear, Cor-Ten cars will absorb abuse and accidental damage that would put cars of other construction right out of service. Cor-Ten cars last longer simply because they are tougher and more rugged.

Equally important, and especially so where corrosive conditions are severe, is the fact that U-S-S Cor-Ten has 4 to 6 times greater resistance to atmospheric corrosion. In every mine in which Cor-Ten cars have been operated side by side with other less corrosion-resistant cars the story has been the same—longer life, fewer replacements . . . less maintenance.

When you are ready to replace your worn-out mine cars, write us. Tell us what you want your cars to do and we will be glad to show you how little it costs to apply U-S-S Cor-Ten to your equipment to give you the results you look for.

A 41-TON ROOF FALL PROVES THE VALUE OF COR-TEN'S GREATER STRENGTH. When a solid chunk of slate, 2 ft. thick, 8 ft. wide and 75 ft. long crashed on top of two cars of identical design, this is what happened. One side of the mild steel car was buckled in a full 8 inches out of line. The other side and one end, too, were badly bent. Car was removed from service for extensive repairs. In contrast, the COR-TEN car was only slightly bowed on one end and one side. After the repair of a broken coupler the car was ready for use.



U-S-S COR-TEN CAR



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UNITED STATES STEEL

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SEMI-AUTOMATIC blacksmith machine, furnace and conveyor with air cooler constitutes one compact unit for sharpening and air-tempering 3,800 bits a day.



OPERATOR PUSHES a foot pedal to start the motor driving the forging mechanism. Other steps of the operation are progressively controlled by two hand levers.

Alloy-Steel Bits and Sharpener Serve Sewickley-Seam Mines

ALLOY-STEEL BITS resharpener and air-tempered in the mine shop on a special machine represent the first choice at the Bunker and Louise mines of the Trotter Coal Co., Cassville, W. Va. Up to a year ago, when the present bit practice was inaugurated, most of the principal types of bits had been tried in the Bunker mine. Sulphur balls constitute the cutting difficulty. Bits must withstand tremendous bending stress, must be quite hard and yet should not break. A small amount of breakage is preferable, however, to very much bending.

To handle sharpening for the two mines, a new Cesco semi-automatic blacksmith machine made by the Cesco Mfg. Co., Homestead, Pa., was installed in the Bunker shop. As sharpened and air-cooled on this machine, the points of the bits have a Rockwell hardness of 61-C to 64-C. Specifications of the steel used are: carbon, 0.55; manganese, 1.00; silicon, 2.00; molybdenum, 1.30; vanadium, 0.35; phosphorus, 0.025 maximum;

and sulphur, 0.025 maximum content.

The machine includes a natural-gas furnace unit with a Micromax temperature controller manufactured by the Leeds & Northrup Co. As observed in operation the day the accompanying photographs were made, the control was set to maintain the furnace temperature at 1,750 deg. F.

One man operates the unit. At the start of the operation, the furnace combustion chamber is loaded with 80 bits and the magazine with 50. After 10 to 15 min of firing to bring the bits to proper temperature, the operator pulls forward a right-hand lever which injects one bit from the magazine into the furnace, advances the bits in the furnace and drops one heated bit into the feed mechanism of the machine. A left-hand lever pulled backward places the bit in a position to be raised by the plunger of the machine, which is of the arc-travel type.

The foot pedal then is pressed, starting the driving motor to forge the bit, which remains visible to the operator

during the forging. As the bit approaches final shape, the operator returns the right-hand lever to starting position, which advances a bit-cooling conveyor one step. Pushing the right-hand lever forward again, as the finished bit drops out, again advances the bits in the furnace and places another hot bit in the machine.

As the sharpened bits are dropped into the conveyor and moved up a notch at a time, they are cooled slowly by a gentle air blast and can be handled by the time they drop into the bit box at the upper end of the conveyor. This air cooling is the only quench treatment required of this special Cesco steel.

The two mines require approximately 3,800 bits per day, which one machine turns out working two 7½-hr shifts. The labor cost of sharpening is approximately 7 mills per bit and the total cost, accurately computed, is 1.7c per bit, including depreciation on the machine (5-years), first cost of bits, repairs to the machine and labor.

Minimizing Battery Connector Corrosion

LOCKING OF CABLE CONNECTORS on battery terminals by corrosion can be minimized by the simple expedient of using cloth washers saturated with petroleum or light grease under the battery connectors. The method was originated by an army mechanic at Ft. MacArthur, Calif., according to the Dec. 19 issue of the Department of Defense *Trade Magazine Newsletter*, Room 2C-765, The Pentagon.



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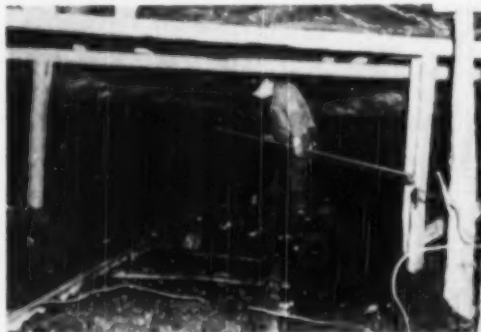
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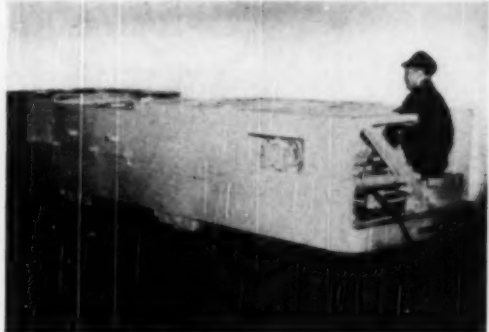


New Equipment for Better Mining and Preparation

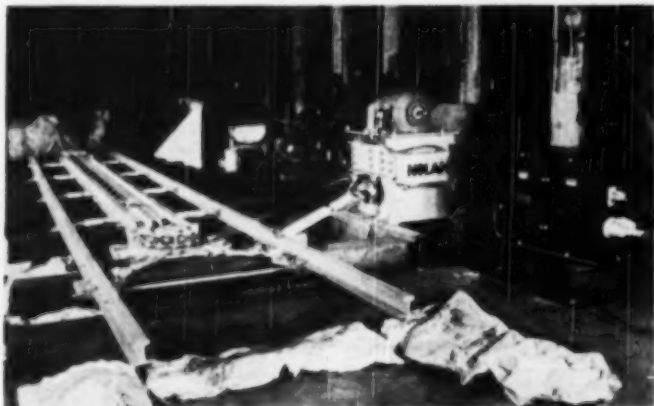
Air-Shooting System	p 122	Diesel Starter Fluid	p 128	Shovel Teeth	p 128	EQUIPMENT SHORTS — A
Auger and Finger Bits	p 126	Gearmotors	p 130	Sinker Drill	p 126	round-up of equipment and
Bulldozer Blade	p 124	Laboratory Unit	p 124	Speed Reducer	p 128	supply items
Car Shaker	p 130	Testing Screen	p 126	Machinery Cleaner	p 126	EQUIPMENT PUBLICATIONS
Car-Spotting Feeder	p 122	Truck Line	p 124	Vibrating Screen	p 124	—Available from the manufac-
Centrifugal Pumps	p 126	Safety-Message Unit	p 126	Vibrator Kit	p 124	turers



AIR-SHOOTING SYSTEM—Armstrong Airbreaker system for air-shooting of coal utilizes a lightweight shell easily handled by the shooter at the face (left) and a compressor that is available as a portable-tramming (right), semi-portable or stationary unit. The system is said by the manufacturer to be safer because of the elimination of explosives and to produce falls of coal that are easier to handle and load, with fewer fines. Coal size can be varied by changing pressure and volume of shell used. In operation, the shell is inserted in a hole drilled by a 2½-in auger according to an established drilling pattern, and the compressor is trammed to within 75 ft of the face. The com-

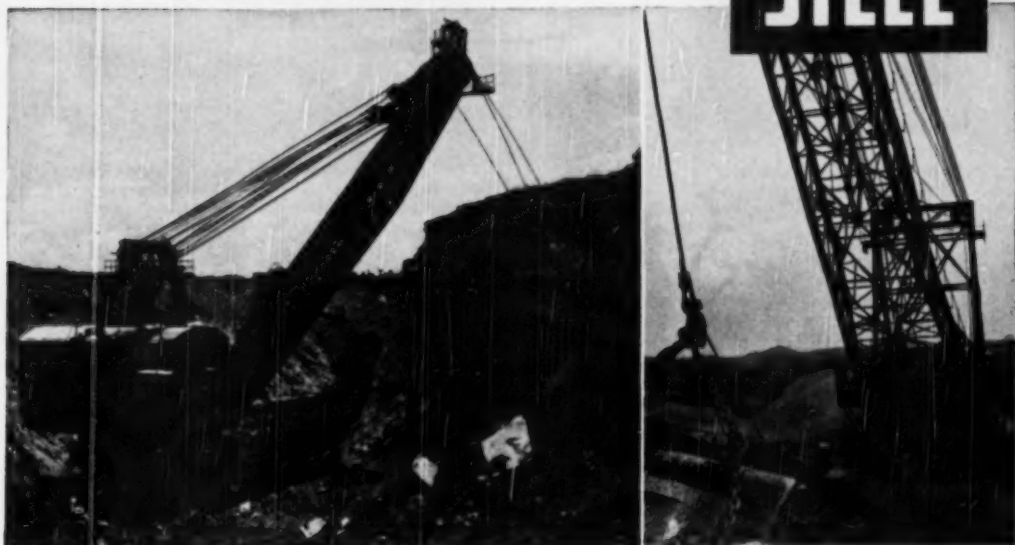


pressor unit is equipped with a protective cab of heavy plate steel which must be raised before the shooting valve can be reached. The sudden release of the high-pressure air at the end of the shell causes the coal to break up with a heaving action that rolls the coal forward for easy loading, the company reports. The compressor builds up sufficient pressure for succeeding shots while the shell is being transferred to the next hole, it is said. Three shell lengths are available, with volume and weights as follows: 75 in, 275 cu in, 42 lb; 88 in, 325 cu in, 48 lb; and 128 in, 465 cu in, 62 lb. Bulletin 949 available.—Armstrong Coalbreak Co., Benton Harbor, Mich.



PORTABLE CAR-SPOTTING FEEDER—Newly developed Nolan car-spotting feeder is designed to be readily portable and to require a minimum of excavation and preliminary foundation work. The machine rests on the ties between the rails and is braced to the rails by screw jacks incorporated into the base frame of the feeder. The drive is on skids and is connected to the gear head by a universal-joint assembly. The unit is available in four sizes. The 5- and 7½-hp models, with drawbar pulls of 6,000 and 9,000 lb, respectively, have a speed of 25 fpm. The 10- and 15-hp units have a speed of 35 fpm and drawbar pulls of 9,000 and 13,000 lb, respectively.—The Nolan Co., Bowers-ton, Ohio.

Where Service Life Counts Most COMMERCIAL FUEL CO. USES J&L WIRE ROPE



Marion 5560 with a 32-yard bucket (above) and (right) Bucyrus-Erie 500-W dragline moving overburden for Commercial Fuel Company. These machines uncover more than one million tons of coal per year—use J&L Wire Rope to cut costs.

J&L Hoist Ropes and Draglines Pay Off in Cubic Yard Mileage on Big Equipment

Commercial Fuel Company knows that strip mine profits really take a beating when a 32-cubic-yard shovel bucket and a twelve-yard dragline have to stop moving overburden because of a breakdown. That's why Commercial Fuel Co. cuts downtime to a minimum by using J&L hoist ropes on its huge Marion 5560 Shovel and J&L draglines on its Bucyrus-Erie 500W.

Stripping two pits near Cumberland, Ohio, these two machines remove an average of 50 feet of overburden from the more than a million tons of coal that Commercial Fuel Co. mines each year. Operating on a schedule such as this, big equipment has to produce and keep on

producing—or loading, hauling equipment and men are forced into costly idleness.

Commercial Fuel Co. knows how to keep its equipment producing. Records show that J&L Wire Rope can be counted on for extra economy through longer service life—less equipment downtime. Long life is a built-in feature of J&L wire rope.

Quality is controlled by J&L in every step of manufacture from the mining of the ore through the final stranding and closing operations.

ATTENTION MANUFACTURERS • OPERATORS

If you build or operate shovels, draglines, scrapers, or any other type of

equipment where wire rope is important to economy and efficiency of operation, contact J&L for information regarding the specific design of wire rope that will do the best job for you.



JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY and JALLOY (hi-tensile steels).

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

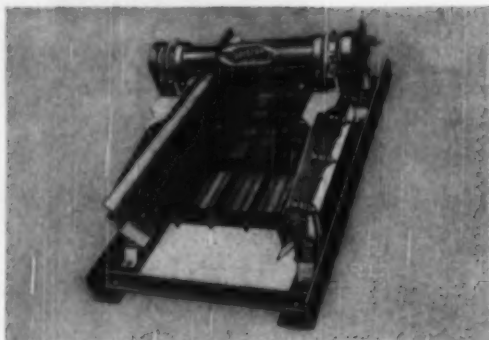
I am interested in using the right wire rope for the job. Please send me a free copy of your handbook "Wire Rope is a Machine."

NAME _____

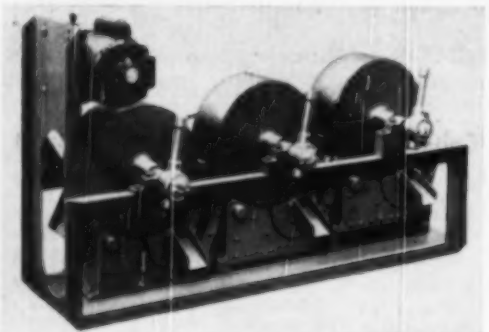
COMPANY _____

ADDRESS _____

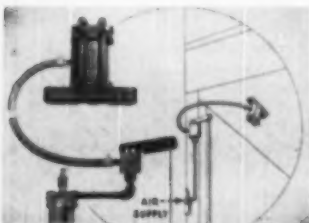
EQUIPMENT NEWS



VIBRATING SCREEN—New type of screening unit said to prevent blinding of carbon coal and other damp, sticky materials features a "unitized" head-motion, unusually rapid stroke-cycle, aerodynamic-type construction and a "graduated" stroke. To permit the longer stroke and higher speed, all dead weight has been removed from the head-motion and live frame, the company reports. The graduated-stroke feature provides a stroke amplitude that is greater at the feed end and smaller at the discharge end, which, with the high speed and long stroke, is said to result in the high capacity and efficiency of the screen. The head-motion, of "unitized" construction, is demountable as a unit and interchangeable from one screen to another, being easily removed by loosening eight bolts. The screen may be driven from either side and screen-cloth wear is lengthened by the elimination of cloth whipping, it is said.—*Deister Machine Co., Fort Wayne, Ind.*



MAGNETIC-MEDIA RECOVERY UNIT—New Laboratory unit employing the patented Jeffery-Steffensen counterflow principle of magnetic separation, developed for treatment of low-grade iron ore is applicable to the recovery of magnetic media in the Heavy-Media process, in which it is said to be especially helpful in preventing slime accumulation in the media. The unit is available in one, two or three sections, with all sections interchangeable and independent of the others except for the drive.—*The Jeffery Mfg. Co., Columbus 16, Ohio.*

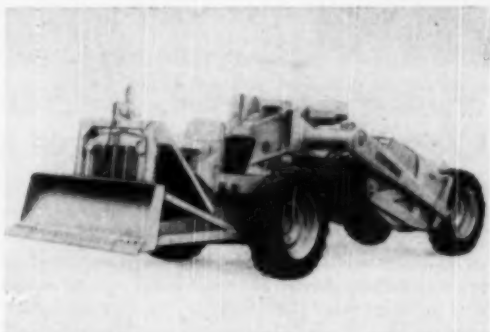


VIBRATOR - INSTALLATION KITS—New packaged "LVF" vibrator kits, which consist of a pneumatic vibrator, a control valve and an air-line lubricator, reportedly contain all parts necessary for an efficient vibrator installation on a wide range of materials-handling applications. LVF kits, which also contain nipples and connectors necessary to permit rapid attachment to hoppers and storage bins, are available with any one of

six standard Cleveland vibrators. Piston diameters range from 1 1/4 to 4 in., over-all widths from 3 to 7 1/2 in., and over-all lengths from 6 to 15 in., with extra-large and heavy-duty models supplied upon request. Operating speeds available in the LVF kits, computed on line pressure of 80 psi, range from 2,100 to 750 vibrations per min.—*Cleveland Vibrator Co., 2718 Clinton Ave., Cleveland 13, Ohio.*



TRUCK LINE—Improved road performance through increased engine power, plus added driver comfort and safety, feature of the 1950 line of Chevrolet commercial cars and trucks, which includes 20 series in nine wheel-bases ranging from 115 to 199 in. and available in a wide variety of models for all types of hauling, according to the company. To provide greater power for all usable road speeds, the heavy-duty Load-Master engine has been increased to 105 hp as compared with the previous 93 hp; and the light- and medium-duty Thrift-Master engine has been increased to 92 hp. Better riding qualities feature the new trucks, with wider cab seats and heavier coils and extra cushioning providing new stability to the spring assembly. Other features include a larger steering knuckle and a larger Hydovac power brake on heavy-duty models for greater braking force.—*Chevrolet Motors Division, General Motors Bldg., Detroit 2, Mich.*



BULLDOZER BLADE—Attachment of a bulldozer blade to the Model D Roadster Tournapull scraper permits using the unit as either a 'dozer or scraper without time lost for changeover, the manufacturer reports. The cable-activated blade is suspended in front of the Tournapull and is electrically controlled by a switch on the dash control panel. The blade has a bowl length of 6 ft 8 3/4 in. and its cutting edge is reversible, with hard-surfaced replaceable tips, and can be raised 3 ft above the ground.—*R. G. LeTourneau, Inc., Peoria, Ill.*

Extra Pulling Power and Speed in Your Trucks with

2-Speed Truck **EATON AXLES**

In the kind of service that requires extra pulling power and extra speed to make time on the open highway, Eaton 2-Speed Axles provide the perfect balance of power and speed. On trucks that must "take it," Eaton Axles reduce stress and wear—not only on the axles themselves, but on engines and all vital vehicle units. Longer axle life with minimum maintenance cost is assured because Eaton's exclusive forced-feed oiling system provides positive lubrication at all vehicle speeds. Eaton Axles are available for most trucks of 1½ tons and larger. Ask your truck dealer for a road demonstration.



*More Than a Million
Eaton 2-Speed Axles
in Trucks Today*



Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO



PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER/DEFROSTER UNITS • SNAP RINGS • SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

America's Most Outstanding Truck Values

—with more power than ever!

Here are the models to make motor-truck history. These new Chevrolet P-L trucks are advance-designed for the heaviest loads, the roughest roads, the lowest cost per trip.

They are far ahead in popularity, performance, payload, price—and they are the *most powerful trucks Chevrolet has ever built*. There is a P-L truck for every trucking job and every one is a real leader on the job.

Chevrolet Motor Division, General Motors Corporation
Detroit 2, Michigan

Leading with all these **Plus** Features:

- TWO GREAT VALVE-IN-HEAD ENGINES: the New 105-h.p. Lead-Master and the Improved 92-h.p. Thrift-Master—to give you greater power per gallon, lower cost per load
- THE NEW POWER-JET CARBURETOR: smoother, quicker acceleration response
- DIAPHRAGM SPRING CLUTCH for easy action engagement
- SYNCHRO-MESH TRANSMISSIONS for fast, smooth shifting
- HYPOID REAR AXLES—5 times more durable than spiral bevel type
- DOUBLE-ARTICULATED BRAKES—for complete driver control
- WIDE-BASE WHEELS for increased tire mileage
- ADVANCE-DESIGN STYLING with the "Cab that Breathes"
- BALL-TYPE STEERING for easier handling
- UNIT-DESIGN BODIES—precision built.

CHEVROLET **P*L***

ADVANCE-DESIGN TRUCKS

P* Popularity Leaders

Official truck registration figures for 1949 show Chevrolet trucks preferred over the next two makes combined—proof of the owner satisfaction they earn through the years.

P* Performance Leaders

The new Chevrolet P-L trucks give you high pulling power over a wide range of usable road speeds—and on the straightaway, high acceleration to cut down total trip time.

P* Payload Leaders

The rugged construction and all-around economy of Chevrolet P-L trucks cut operating and repair costs—let you deliver the goods with real reductions in cost per ton per mile.

P* Price Leaders

The Chevrolet truck line is the very lowest priced line in the field—saves on initial cost. What's more P-L trucks give owners dollar and cents savings in maintenance and operation.



*Marion presents
AN ALL-NEW
6 CUBIC YARD
COAL LOADER!*

It's the
**III-M
MARION**

**WITH
WARD-LEONARD CONTROL!**



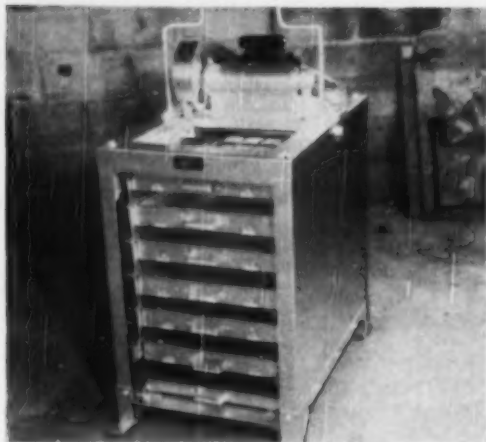
IT'S FAST! IT'S POWERFUL! IT'S ECONOMICAL!

Here's the new all-electric version of the MARION 111-M, a 6 cubic yard coal loader that's setting production records across the country. It's a blend of speed, power and

economy that gets big jobs done quickly. Delivery dates?—earlier than you might think. Why not check your nearest MARION District office or agent today?



EQUIPMENT NEWS



TESTING SCREEN—Gilson mechanical testing screen, now available to the coal industry with either round or square screen openings, accommodates samples up to 1 cu ft, making from two to seven separations simultaneously in 5 min or less. Screen trays and dust pan are designed to weigh the same to eliminate transferring samples before weighing. ASTM-standard screen surfaces are held under tension that insures proper vibration and permits easy replacement, it is said. For testing very fine materials, an attachment is available for using 8-in testing sieves with the vibrating unit. The unit reportedly is designed for handling 4-in to 200-mesh material.—*Gilson Screen Co., Box 186, Mercer, Pa.*



CENTRIFUGAL PUMPS—Addition of a new line of straight centrifugal pumps reportedly expands the full Marlow line to 56 basic series of pumps available in various modifications of mountings, fitting and materials for a wide range of requirements. The new centrifugals are introduced for use primarily on installations with flooded suctions and are offered in close or long-coupled construction, in 1- to 4-in sizes with capacities from 10 to 1,000 gpm. Called Types SC and SL, the new units are said to provide dependable high efficiency with economical first cost and low operating cost and can be installed and operated in either vertical or horizontal positions.—*Marlow Pumps, Ridgewood, N. J.*



AUTOMATIC SAFETY-MESSAGE REPRODUCTION UNIT—"Saf-T-Vox" reportedly is a small compact unit for the recording and automatic reproducing of safety messages that may be operated by interception of an electric-eye beam, or other means, as an individual approaches a danger point, starts a machine, etc. By recording the safety director's message and reproducing it whenever and wherever he desires, Saf-T-Vox enables the safety man to deliver his verbal warning at the danger point before the danger moment. The unit employs a mechanism for handling a magnetic tape on which messages are recorded, an amplifier, a loud speaker and a starting trigger. No resetting or rewinding is necessary. Ten messages of 10-sec duration can be repeated one at a time as the device is started. Bulletin available.—*American Alliance Co. Inc., 1245 Niagara St., Buffalo 13, N. Y.*

UNDERGROUND MACHINERY CLEANER—New Homestead-Yeager all-electric steam cleaner is designed

for cleaning of machinery underground and is made in two models, Pennsylvania-approved fresh-air unit and a permissible unit that will have U.S.B.M. approval. The unit is electrically heated and powered, generates no flame, sparks or contaminating odors, is wheel-mounted for ready portability and is available for practically any power circuit, the manufacturer reports. Bulletin available.—*Hydraulic Jenny Division, Homestead Valve Mfg. Co., Coraopolis, Pa.*



AUGER AND FINGER BITS—Newly improved Carboloy auger-drill bits offer increased ease of drilling and higher drilling speeds, with faster cutting made possible by the use of larger clearance and relief angles than heretofore believed practicable, according to the company. Length of carbide also has been increased to permit more regrinds and longer total life. The bits are available from stock in 1½-in, 2-in and 2½-in diameters. The improved Carboloy finger bit, stocked in the ¾-in size, also in-

corporates larger clearance angles that reportedly permit freer cutting and faster drilling while reducing the pressure required on the drill.—*Carboloy Co., Inc., Detroit 32, Mich.*



SINKER DRILL—New CP-59 is recommended by the manufacturer for holes up to 25 ft as an outstanding drill in the 55-lb class, with high drilling speed, rotation power and hole-cleaning ability. Among the features cited is a new four-in-one backhead that permits quick changeovers to either plain dry, blower dry, wet or air-water operation by simply removing a plug and changing water- or air-valve assemblies. A newly designed valve, a new highly efficient lubrication system, a replaceable

Specify Thermoid Steam Hose

Powerflex Wire Braid Steam Hose

Unequalled for strength and flexibility, it offers more capacity, greater safety, longer wear. The tough, thick, heat-resisting inner tube is of specially compounded black rubber . . . high-tensile steel wire braids safeguard against bursting . . . asbestos braid dissipates heat and firmly bonds the cover to the hose body. Special cover is heat and abrasion resistant. Furnished in sizes from $\frac{1}{2}$ " to $2\frac{1}{2}$ ", in lengths up to 50 feet. An all-purpose steam hose for all pressures up to 200 psi.



Hi-Temp Steam Hose

Mandrel-built—special heat-resisting rubber tube . . . braided asbestos-yarn reinforcement . . . heat and wear resistant cover. Furnished in sizes from $\frac{1}{2}$ " to 2" inside diameter in 25 or 50 foot lengths. A lighter weight all-purpose steam hose for superheated steam up to 200 psi.



#300 Steam Hose

Heat-resisting rubber tube. Cotton fabric reinforcement. Heat and wear resistant cover. Furnished in sizes $\frac{1}{2}$ " to $2\frac{1}{2}$ ", in 25 and 50 foot lengths. For general service where steam pressure does not exceed 150 psi.



These latest developments in steam hose are typical of the results obtained through Thermoid's continuing research and study of product applications. Thermoid's planned program of product research and development assures you of maximum service and lowest operating costs whenever you

specify Thermoid Industrial Rubber Products.

It will pay you to **Specify Thermoid!**

Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

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CONTROL COAL DUST with Pangborn Dust Control



PANGBORN Dust Control Equipment gives you:

- efficient coal dust disposal and reclamation
- increased safety
- improved working conditions
- lower equipment maintenance cost
- decreased dust nuisance

In scores of coal preparation plants, Pangborn Dust Control installations have paid off over and over again by improving working conditions, eliminating dust nuisances, cutting maintenance costs, doing a superior job of dust disposal and reclamation. By effectively collecting the fine coal dust produced in the operation of tipples, dry cleaning, de-dusting and other preparation facilities, Pangborn has become a by-word for making profit-stealing coal dust behave.

Whatever your dust problem—high machinery maintenance, nuisance, lost profits through faulty reclamation—Pangborn engineers can help you with an economical and effective solution. Let us make a *dust pocket survey* for you. No obligation—but with the information it gives us, we can recommend the right Pangborn Dust Control Equipment to rid your plant of dust hazards and nuisances.

Write for Bulletin 909A, "The Control of Industrial Dust." PANGBORN CORPORATION, 288 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for all the latest developments in Dust Control and Blast Cleaning Equipment.



THE DUST HOG

from stealing profits with

Pangborn

DUST CONTROL

bronze chuck nut and cylinder bushing liner also add to performance and durability of the unit, according to the company. Bulletin SP-3009 available.—Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17.

DIESEL STARTER FLUID—New Sinclair patented diesel starter fluid, offered in gelatin capsules and cans, is designed to eliminate use of heaters and electric boosters heretofore required for starting in cold weather. With Sinclair diesel starter fluid the practice of keeping engines running at idling speeds can be entirely eliminated and disruption of schedules and loss of production where engines cannot be started entirely avoided, the company reports. Available through Sinclair distributors.—Sinclair Refining Co., 630 Fifth Ave., New York.



SPEED REDUCER—New "Torque-Arm" speed reducer mounts directly on the shaft to be driven and, according to the manufacturer, eliminates the necessity for special engineering. Designed as a "package" item to be available from distributors' stocks primarily for conveyors, bucket elevators, agitators, mixers, feeders, processors and similar machinery, the unit consists of a reducer with a fixed ratio of 15:1, driven by a motor through any V-belt or flat-belt drive. Any desired output speed from 13 to 133 rpm can be obtained through the use of stock sheaves. The unit is easily shifted from one machine to another, and if a different-size shaft is involved, an inexpensive bushing is all that is required, it is said. The reducer is made in six sizes with capacities up to 28.5 hp. Bulletin No. A-470 is available.—Dodge Mfg. Corp., Mishawaka, Ind.

SHOVEL TEETH—New Baer replaceable shovel teeth are said to lock rigidly to their adapters for longer wear by a patented triple-locking design that distributes digging stresses over a larger locking area. Tongues and slots, horn and shoe are wedged solidly together by a tapered pin driven through the assembly and securely locked by bending its maleable tip into a special recess, it is said. The new Fibraloy steel used in the teeth castings has a fibrous structure that permits high strength and shock-resistant properties at higher hardnesses, with shock resistance remaining high

Check the permissible best suited to your job

	LUMP COAL	FINE COAL	WET WORK	ROCK WORK
RED H* C	✓			
RED H D	✓			
RED H F	✓			
BITUMINITE* D	✓			
RED H A	✓			
RED H L	✓			✓
COLLIER* C			✓	✓
RED H B			✓	✓
HERCOGEL* A				✓
HERCOGEL 2				✓

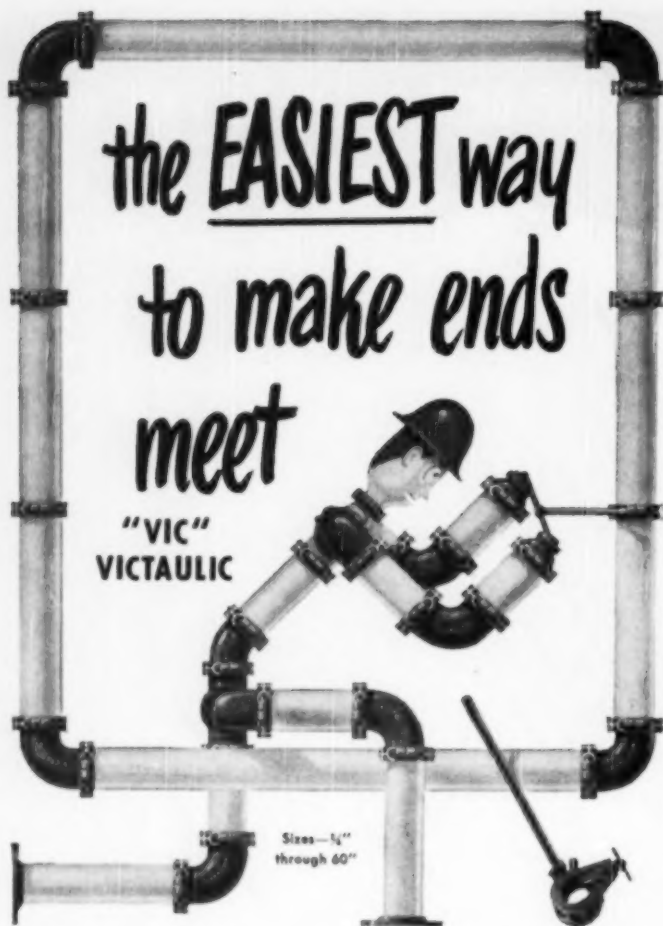
Fast, slow, or gelatin permissibles . . . Hercules can supply you with the correct explosive for any coal mining need. You can quickly determine which suits your requirements most effectively and economically.

HERCULES POWDER COMPANY 936 King Street, Wilmington 99, Delaware

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XR50-4



Even on the toughest piping jobs VICTAULIC Couplings, Victaulic Full-Flow Elbows, Tees and other Fittings will make joining those pipe ends quick, easy, and economical — assure you a leak-tight piping job!

You save every way when you join up with "Vic"—a simple two-bolt design gives quick, easy hookups, a standard T-Wrench is the only tool needed for connections... joints are positive-locked, leak-proof, will stand up under extreme pressure, vacuum, or strain conditions.

GROOVING THOSE PIPE ENDS is a cinch the Victaulic Way... "Vic-Groover" grooves 'em automatically in half the time of a conventional pipe threader!

The COMPLETE Victaulic Line can't be beat for efficient, dependable, on-the-job piping construction. Yes Sir! Victaulic IS the Easiest Way to Make Ends Meet. JOIN UP WITH "VIC"—make your next piping job ALL VICTAULIC. Write today for these two:

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Pipe Couplings, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

26TH VICTAULIC YEAR

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The easiest way to make ends meet

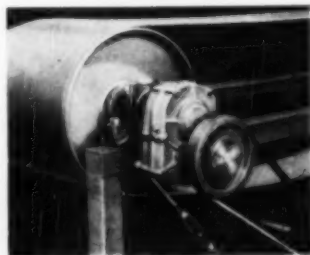
VICTAULIC
PIPE COUPLINGS AND FITTINGS



at sub-zero temperatures, the company reports.—Baer Steel Products, Inc., Auburn, Wash.



CAR SHAKER—New "Lo-Hed" car shaker offered in combination with a Lo-Hed 5-ton twin-hook hoist and controls, or with a single-hook 5-ton hoist and controls, or separately for use with existing hoisting equipment, permits emptying cars by one man in a matter of minutes, the manufacturer reports. Double safety is provided with Lo-Hed interlocking controls, which prevent the shaker from operating until in position, or the motor trolley from being started when the shaker is in operation. Bulletin available.—*Materials Handling Division, American Engineering Co., Aramingo Ave. and Cumberland St., Philadelphia 25, Pa.*



GEARMOTORS — New complete line of gearmotors to be manufactured and sold jointly by Foote Bros. Gear

Hi-Lift



... for low cost!

If you're looking for lower cost stripping, here's the answer . . . an Oliver "Cletrac" crawler tractor and Drott Hi-Lift Shovel.

This cost-cutting unit has a wide, deep hydraulically operated bucket that gets a full load every time. The husky power of the Oliver "Cletrac" gives you top crowding action, and the unit bears down and in as it loads. The bucket pivots . . . raising the cutting edge 16 inches . . . on two rugged shoes before lifting, assuring maximum break-out action. The bucket then tilts upward like a shovel for a full bucket every time.

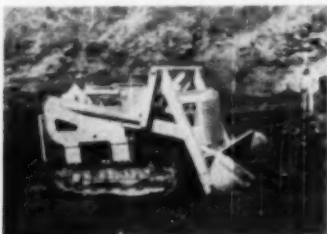
Then, the Hi-Lift takes over. The full 10½-foot lift from the ground to hinge pin of bucket makes loading into trucks up to 8½ feet high, fast and easy. Operator always has maximum visibility for fast operation.

Remember, too, with the famous Oliver "Cletrac" design, there is no excess strain on tractor frames or steering mechanism, even with a full loaded bucket, so operating and maintenance costs are exceptionally low.

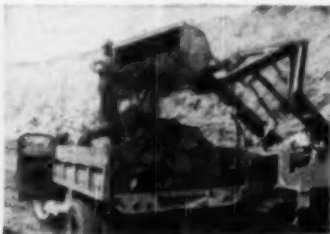
Your Oliver "Cletrac" Distributor will be happy to give you all the facts.



Plenty of crowding action forces bucket under vein.



Breaking coal out of vein. Loader shoes are making ground contact and 16-inch pivot of cutting edge provides plenty of break-out action.



Hi-Lift makes loading of truck easy. Load may be dumped slowly or in a trip-like action.

Cletrac

a product of

THE OLIVER CORPORATION

Industrial Division, 19300 Euclid Avenue, Cleveland 17, Ohio

A Complete Line of Crawler and Industrial Wheel Tractors



"THE SIGN OF
EXTRA SERVICE"

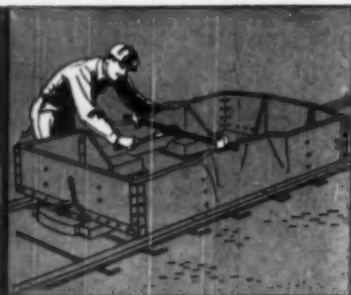


For **SAFE—
FAST—
DEPENDABLE**
**JACKING
OF MINE
EQUIPMENT**
**DUFF-NORTON
JACKS**

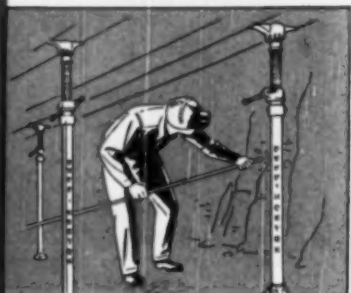


No.
316-MT
Automatic
Lowering
Jack

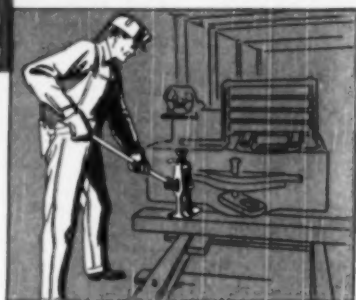
Duff-Norton Mine Jacks, available in a wide variety of styles and capacities, meet exacting requirements for every lifting, lowering, pushing or pulling job in and around your mine. These jacks more than pay for themselves in a short time with savings in time, effort, labor and money.



Push and Pull Jack used for straightening sides, ends and sills of mine cars.



Mine Roof Jacks support mine roofs, cross timbering and protect working face areas.



Illustrated is a five-ton automatic lowering jack lowering a mine car. Convenient and economical.

Write today for
your copy of this
new "Handy Guide"
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MINE JACKS



See Your Industrial Distributor.



THE DUFF-NORTON MANUFACTURING CO.

MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA.—CANADIAN PLANT, TORONTO, ONT.

"The House that Jacks Built"

& Machine Corp. and The Louis Allis Co. features hard helical gears and other moving parts that have been processed and heat-treated under new and improved methods of manufacturing control, it is reported. The new gearmotor, manufactured in 17 sizes, provides single-, double- and triple-reduction units with output speeds from 780 down to $7\frac{1}{2}$ rpm. Integral horsepower ratings from 1 through 75 are available for practically any industrial application and a wide selection of motor enclosures is offered, including the conventional open dripproof, splashproof, totally enclosed and explosionproof construction. Ac and dc motors of all types, as well as special motors, are available. Information available from either company.—Footle Bros. Gear & Machine Corp., Chicago, or Louis Allis Co., Milwaukee, Wis.

Equipment Shorts



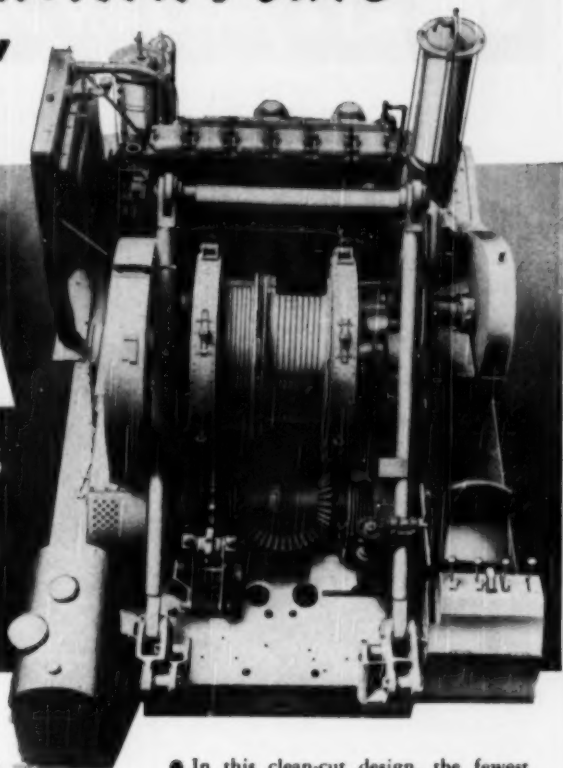
FIRE EXTINGUISHER—New Randolph portable 6-lb carbon-dioxide fire extinguisher offering 20% additional capacity over previous company models features a thumb-trigger release and self-aimed nozzle and requires only one hand for operation. The unit is especially adapted to smothering flammable liquid and electrical fires.—Randolph Laboratories, 8 E. Kinzie St., Chicago 11.

RECAPING RUBBER—New "Dultrid" blend of high-porosity rubber reportedly provides quicker stops on slippery roads and long mileage as indicated by road testing.—General Tire & Rubber Co., Akron, Ohio.

CARBURETOR CLEANING—New "Gumouter" tool designed for use with Gumout permits thorough cleaning of all internal parts of the carburetor within 15 min without taking the carburetor apart or off the engine, according to the manufacturer. The Gumouter, which permits a 50-50 solu-

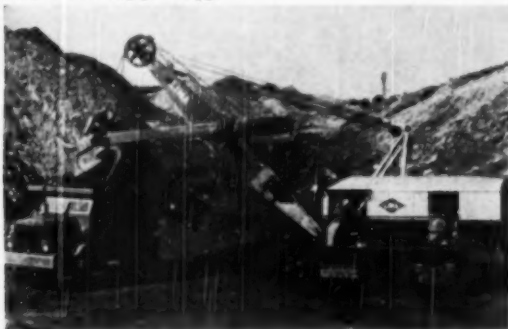
Built-in STAMINA cuts "DOWN-TIME"

of **LIMA** Shovels, Cranes and Draglines



EXAMINE THE MAIN MACHINERY AND YOU'LL UNDERSTAND WHY!

LIMA Type 1201 Shovel with 32½ foot boom, 22 foot dipper handle and 3½ yard dipper.



● In this clean-cut design, the fewest possible number of shafts are required to transmit power from engine to dipper. Important bearings, including those in the drum, are anti-friction type. Large drums increase output and minimize cable wear. Permanently aligned shafts prevent chattering and grabbing of clutches. Extra-rugged construction of machinery base, truck and front end equipment provides ample strength to withstand heavy loads. These are only a few of the reasons why LIMA machines are making records of outstanding performance with *minimum down-time*.

The LIMA line includes Shovels ¼ to 6 yards, Cranes to 110 tons, and Draglines Variable. Rubber-Mounted units are available with ¼ and 1 yard shovels and 35 ton cranes. Offices in principal cities of the world.

Lima Shovel and Crane Division

LIMA, OHIO

OTHER DIVISIONS: Lima Locomotive Works Division; Niles Tool Works Co.; Heaven, Owen, Bentschler Co.



SAFETY *you can SEE!*



SEE WHY THEY LAST!

● Exclusive *nose-and-pocket* heads of American Couplers protect the internal parts. Husky flanges distribute buffing across the coupler face. Locks engage with a tight grip—no slack; *no costly wear*. Pull is transmitted through cast steel contact—*not* through the lock pivot pins.

ANY TWO HEADS WILL COUPLE, and all heads are always ready to couple. In *American* design, couplers cannot be locked, either in open position or in closed position, unless two heads are *tight* together. And, as heads are uncoupled, the locks instantly position themselves for *automatic* recoupling.

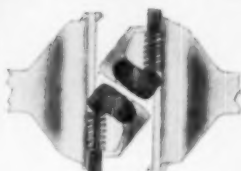
American Couplers have *extra-wide* gathering range; won't "jackknife"; unlock from either side without stepping *between* cars; permit rotary-dumping without uncoupling. They're the couplers that *stand up* on tough jobs!



SEE FOR YOURSELF!

Write for this new illustrated booklet. It gives facts, figures, specifications, dimensions. American Couplers are ideal for today's larger cars and longer trains.

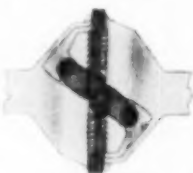
SEE HOW THEY LOCK!



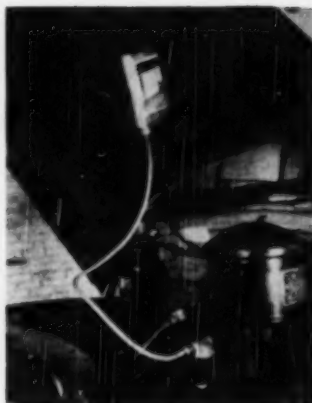
OPEN



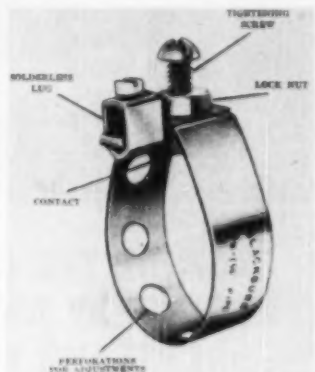
LOCKING



LOCKED



tion of Gumout and gasoline to be gravity-fed through the carburetor while the engine is running at various speeds, is available as a complete package.—Pennsylvania Refining Co., Gumout Division, Cleveland 4, Ohio.



GROUND CLAMP—Blackburn adjustable ground clamp designed for maximum contact and capacity at less cost is said to be foolproof and vibration-proof and is easily installed. It is available in two sizes: for $\frac{1}{2}$ - to 1 $\frac{1}{4}$ -in pipe and for $\frac{3}{4}$ - to 3-in pipe.—Blackburn Specialty Co., 6541 Euclid Ave., Cleveland 3, Ohio.



BOOT DRYER—"Boot-Vent" inserted in boots permits air circulation to provide faster drying and also is

Safe...Sure AMERICAN MINE CAR COUPLERS

AMERICAN STEEL FOUNDRIES, 410 N. MICHIGAN AVE., CHICAGO 11, ILL.

new! MINING EQUIPMENT SECTION OF THE TIMKEN ENGINEERING JOURNAL...

FOR MINE EQUIPMENT
MANUFACTURERS AND
MINE OPERATORS

THE TIMKEN® ENGINEERING JOURNAL

Mining Equipment Section

THE TIMKEN ROLLER BEARING COMPANY
CANTON 6, OHIO, U. S. A.

Just off the press, this new Mining Equipment Section of the Timken Engineering Journal contains complete data on selection and mounting of Timken bearings in Mine Cars; Mine Locomotives; Mining Machinery; Conveyors; Crushing, Pulverizing and Screening Equipment and Mine Auxiliary Equipment. Valuable data is also given on auxiliary parts such as nuts, washers, dust collars, conveyor rolls and bearing seals.

This booklet will be an important addition to all mine equipment designers, mine operators and mine reference libraries.

Write today on your letterhead to Dept. AC-2, The Timken Roller Bearing Company, Canton 6, Ohio for your free copy.

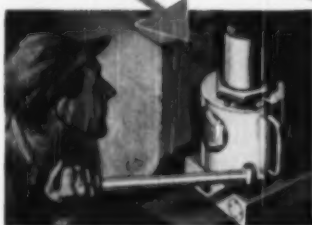
THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO
Cable Address "TIMROSCO"

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TAPERED ROLLER BEARINGS

When You Buy Blackhawk Jacks, You GET ALL THIS



30-Ton Capacity
Model GS-11
Weights only 111 lbs.



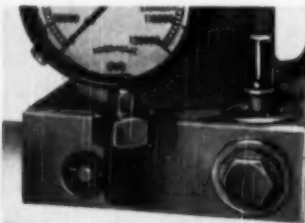
PATENTED DOUBLE PUMP—all in ONE unit! Speed pump provides fast load contact—power pump cuts in automatically! No shifting of handle, no double-yoke as with separate pumps.



EXTRA SAFETY—The pump beam is protected by the handle and base. The pump is protectively hidden in the super-strong base which is machined from a single piece of steel.



ALL-DIRECTIONAL OPERATION—Full power and travel at any angle, vertical to horizontal. The handle serves as a side-rest for horizontal use.



EXTRA UTILITY—A gauge can mount in the base to show pressure exerted for measuring or testing jobs. The answer to weighing vast tonnages and large objects.

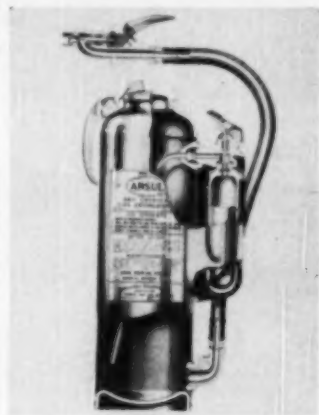
There's a big difference in Hydraulic Jacks! Construction, mining and industrial men discover that Blackhawk Jacks last longer, serve better. It's the world's most complete line of Hydraulic Jack Equipment. And every model (1½ to 100-ton) is one-man operated. Order from your supply house. Write for catalogs. Blackhawk Mfg. Co., Dept. J4520, Milwaukee 1, Wis.



BLACKHAWK

"PORTO-POWER" • PIPE BENDERS • WRENCHES

said to keep boots in better shape when not in use. Boot-Vent comes in pairs for use in all boots, sizes 8 to 12. —Mann Engineering Co., 429 Penn Ave., Pittsburgh 22, Pa.



FIRE EXTINGUISHER—Improved Ansol Model B dry-chemical fire extinguisher is said to be completely water-tight and incorporate 12 new design features for greater strength, dependability and ease of maintenance. The unit is available in 20- and 30-lb sizes. A price reduction on its fire-extinguishing equipment, granting freight allowances on shipments of 200 lb or more, also has been announced by the company. Bulletin available.—Ansol Chemical Co., Marinette, Wis.

EXCAVATOR - LIFT - CAPACITY RATINGS have been increased on three Koehring units as follows: for the Model 304, maximum capacity now is 13.9 tons with crawler mounting and 25 tons on the rubber-tired truck and cruiser cranes; for the crawler-mounted Model 605, 36 tons; and for the Model 1005, 79½ tons. New specification sheets available.—Koehring Co., Milwaukee 10, Wis.

LUBRICANT PUMP—New portable high-pressure Centro-Matic Model 1808 bucket pump has a 30-lb-lubricant capacity and is designed for use with the Centralized single-line lubrication system on one or more machines not equipped with pumps or where machines are grouped so that it is impractical to use a centralized pumping unit. Bulletin 800-1 available.—Lincoln Engineering Co., 5729 Natural Bridge Ave., St. Louis 20, Mo.

EARTHMOVER—The LeTourneau C Roadster Tournapull now is available with either a General Motors 6-71, Cummins HBI-600 or Buda 6-DC-844 engine, the manufacturer reports. The C Roadster prime-mover unit also now is built for operation at a higher top speed, being equipped

Announcing...

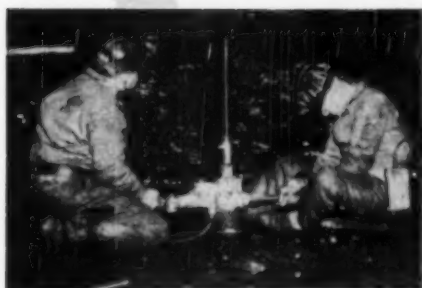


"TOUGH BODY
CONSTRUCTION
FOR LONGER LIFE,
LOWER COST"

"UNIFORM
PRONG TAPER
FOR FREE, EASY
DRILLING"

"KENNAMETAL INSERTS
TAKE UP TO 100 TIMES
MORE SURFACE WEAR,
GIVE MANY REGRINDS"

"SUPERIOR
KENNAMETAL
EDGE THAT GIVES
20% FASTER
DRILLING"



Other Kennametal Bits used for drilling bolt holes



STYLE
FD

drills laminated sandstone



STYLE
PAF

drills massive sandstone
and hard limestone

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DRILL BITS • MACHINE BITS • STRIP BITS • ROCK BITS

Kennametal RD Bit for Drilling Bolt Holes

Here is another of Kennametal's pace-setting drill bit developments that offers you unprecedented advantages for more speed and lower cost. It is the only cemented carbide rotary drill bit built exclusively for drilling bolt holes in hard boney, hard slate, and hard shale.

You save the cost of extra drills . . . as illustrated, your present electric drills will do the job. Compressor cost, air hose cost, stoper cost are eliminated. For fast drilling there is no equal.

Your Kennametal representative will not only be glad to demonstrate the Kennametal line of rotary drill bits (see FD style for more difficult drilling) but he will also be glad to suggest many helpful ways to mount your drills to use them! This can mean a tremendous saving in your roof bolting plans. Contact the representative near you today or write Mining Division, Kennametal Inc., Latrobe, Pa.

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COUPON
— mail for
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with a heavy-duty five-speed transmission with a top road speed of over 30 mph in fifth gear, in addition to the four working speeds previously available from 3.0 to 19.8 mph.—*R. G. LeTourneau, Inc., Peoria, Ill.*

CHAIN OILER—Solenoid-operated chain oiler for automatically lubricating conveyor chains assures positive

lubrication whenever the chain is running, eliminates the need for applying lubricant by hand and avoids excess lubricant, according to the manufacturer. Lubricant is fed by gravity from reservoirs available in six sizes to a brush that rides the chain. Dual-brush units available can be used on either one or two chains.—*Oil-Rite Corp., 3491 S. 13th St., Milwaukee 15.*

Equipment Publications

New Bulletins Available Without Charge on Request to the Manufacturer—Arranged for Your Convenience to Permit a Quick Check of Items of Interest—Literature on New Equipment Described on Previous Pages Also Is Normally Available From the Manufacturers.

CENTRIFUGAL PUMPS—Durlon Co., Inc., Dayton 1, Ohio. Bulletin #12A on the installation and operation of centrifugal pumps in corrosive service deals specifically with Durlon pumps but is applicable to all centrifugal pumps. Subjects covered include: proper location and foundations; correct alignment; priming standard pumps; piping arrangements; adjustment of impellers; common troubles and how to overcome them; and friction data, formulas for figuring capacity, head and horsepower, and conversion data.

CHEMICAL PRODUCTS, SERVICES—American Cyanamid Co., 30 Rockefeller Plaza, New York 30. Revised edition of "Products and Services of American Cyanamid Co. for Industry and Agriculture" briefly describes the products and services which the company offers industry, agriculture and mining and outlines the divisional structure through which such products are sold.

COAL CONCENTRATOR—The Humphreys Investment Co., First National Bank Bldg., Denver 2, Colo. Bulletin 10, "Humphreys Spiral Concentrator Closed-Circuit Test Unit, Manual of Operating Instructions," describes the Humphreys spiral concentrator, why it works, its field of application, procedure for test work and actual operation, giving the proper conditions for obtaining optimum results.

CONTROL CENTERS—Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Booklet B-4213 on new standardized control centers discusses the various safety features of the units and includes sections on how to plan a control center, a table containing the dimensions and weights of starter and other interchangeable units, such as circuit breakers, single-phase distribution transformers and lighting panelboards, plus reference tables for selection of starter sizes.

DIESEL ENGINE—Superior Engine Division, The National Supply Co., Springfield, Ohio. Bulletin #312 on Superior diesel engines for stationary installation features 60 yr of Superior engine research and production development and describes numerous installations of these engines within the past 3 yr. Along with more than 100 engine specifications showing a range in power from the naturally aspirated 6-cylinder, 175-hp engine with $8\frac{1}{2} \times 10\frac{1}{2}$ in bore and stroke, to a supercharged 8-cylinder 1800-hp engine with $14\frac{1}{2} \times 20$ in bore and stroke.

ELECTRIC WIRE AND CABLE—Rome Cable Corp., Rome, N. Y. Booklet entitled "The Story of Rome Cable Corp." covers the background, physical equipment and products of Rome Cable, with details of the company's research, manufacturing facilities and experience, and general descriptive information on the manufacture of wire and cable.

ELECTRICALLY HEATED RUBBER—H. F. Goodrich Co., Akron, Ohio. Information bulletin on embedded-wire-resistor type of electrically heated rubber provides detailed data on construction and use of the product.

FILTER—Oliver United Filters, Inc., 23 W. 42d St., New York. Bulletin #60 describes operation and features of the American disk-type continuous filter, including illustrations of typical applications and data on sizes and specifications.

FIRE EXTINGUISHERS—Ansul Chemical Co., Marietta, Wis. Catalog illustrates and describes the complete Ansul line, including the improved Ansul Model B extinguishers, piped systems, large stationary units, fire trucks, trailers, etc., with charts showing characteristics of approved hand-fire equipment and comparative effectiveness graphs.

FIRE-FIGHTING CHEMICAL—Solway Sales Division, Allied Chemical & Dye Corp., 40 Rector St., New York 60. Booklet entitled, "Stop Small Fires from Growing Up" describes the value of calcium chloride as a non-freezing, non-evaporating and non-fouling solution for many types of approved fire-fighting equipment used in extinguishing Class A fires and illustrates types of equipment available and suggested locations for their use.

INSTRUMENT TRANSFORMERS—Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Booklet B-4319 describes construction features of the complete Westinghouse line of instrument transformers and covers methods of insulating current and potential transformers using oil, plastic or dry-type construction for all voltages. Types of cores are shown and reasons why high-permeability Hipersil core material saves weight and reduces size are given, in addition to a two-page table showing typical shapes, construction and applications.

LUBRICATING DEVICES—Trico Fuse Mfg. Co., 2945 N. 15th St., Milwaukee 12, Wis. Broadside 4900-OB describes and

pictures the Trico line of constant-level, gravity-feed, wick-feed, thermal, bottle, "Micro-Matic," "Vari-Feed" and under-feed oilers, combination oil cups and oil waxes and their application. Bulletin 31 describes a dual-purpose unit consisting of a visible oil cap and visible oil gage for lubrication and periodic checks of bearings, transmissions and crankshaft cases, etc.

MAGNETIC CONTACTORS—Euclid Electric & Mfg. Co., Madison, Ohio. Bulletin 1015A describes the features, construction and operation of the recently improved ac magnetic contactors available in 100- and 150-amp sizes.

MATERIALS-HANDLING—Aerol Co., Inc., 2820 Ontario St., Burbank, Calif. Manual offering 355 ways to cut inventories describes all Aerol materials-handling problems, with dimensions, load ratings and code numbers tabulated for quick reference.

OFFICE DESKS—Remington Rand, Inc., 315 Fourth Ave., New York 10. Bulletin FF-115 on the company's latest line of "Foremost" steel desks includes a detailed list of specifications for the desks and describes their various features such as interchangeable pedestals and tops. Elimination of waste space is achieved by smaller, more functional design that permits the comfortable use of four Foremost desks in a space ordinarily used for three.

PIPE THREADER—Beaver Pipe Tools, Inc., Warren, Ohio. Bulletin on Model-C portable power units covers operation, prices and users' experience with the tools.

PIPE TOOLS—Beaver Pipe Tools, Inc., Warren, Ohio. Catalog #50 covers the entire line of Beaver pipe tools, machines, power drives and threading oil, with complete ordering specifications.

ROOF BOLTS AND WEDGES—Hubbard & Co., Pittsburgh 1, Pa.; Chicago 50, Ill. Bulletin describes the Hubbard mine-roof anchor-bolt designed on the double-tapered-wedge principle and illustrates installation, along with specifications and detailed information on the bolts, expansion wedges and installing tool.

SHOVELS—Wood Shovel & Tool Co., Piqua, Ohio. Bulletin illustrates and describes "Zephyr-Weight" aluminum alloy shovels and scoops said to cut usual shovel weight in half and to be acid-resistant, non-corrosive and non-sparking. Specifications for the various styles are listed.

SILENT-CHAIN DRIVES—Whitney Chain & Mfg. Co., Hartford 2, Conn. Catalog facilitates selection of silent-chain and chain drives available from stock through use of stock-drive selection tables that require no special chain knowledge and eliminate tedious calculations usually required in determining power-transmission requirements. Whitney silent-chain drives are available from fractional to over 50 hp.

SWITCHGEAR—General Electric Co., Schenectady 5, N. Y. Bulletin GE-5436, "Switchgear for Mines," covering automatic sectionalizing units for inside-of-mine applications, offers detailed information on operating features, installation and specifications.

TIMBER PRESERVATIVE—Osmose Wood Preserving Co. of America, Inc., 1437 Bailey Ave., Buffalo 12, N. Y. Bulletin describes the Osmose system of treating timber, outlines methods of application, cost and service features, and illustrates typical uses.

WELDING ALLOYS—Eutectic Welding Alloys Corp., 40 Worth St., New York 13. Directory Welder for 1950 on low-temperature welding alloys describes 65 EutecRods for torch welding and EutecTodes for arc welding, with characteristics, sizes and application data.

FAST ON THE JOB



because it's Geared to the Job!

The Model HM like other Payloaders is a better, more productive and more versatile tractor shovel because it is a complete unit-design tractor and shovel. It is NOT a "marriage of convenience" of a shovel attachment to a tractor designed for drawbar work.

Consider just one item — the transmission. The HM Payloader transmission has four forward and four *faster* reverse speeds plus quick, easy, shuttle-action forward-reverse shift. That's an arrangement that spells *speed* on tractor shovel work. It gets into reverse motion fast . . . it backs up faster than it goes forward. It's one *big* reason why Payloaders run rings around tractor shovel attachments having only one slow-speed reverse gear.

Other HM Payloader advantages are four wheel drive on large earthmover tires for *real* traction and flotation, balance and stability, unmatched operator visibility and many others. Get the complete Payloader story from your Hough Distributor today or write The Frank G. Hough Co., 735 Sunnyside Avenue, Libertyville, Illinois.

Send for catalog covering the big Model HM 1 1/2 yard Payloader or smaller sizes — the 1 1/4 yd. Model H1; the 3/4 yd. H2; the 1/2 cu. ft. H3.



4

Wheel Drive

4

Speeds Forward

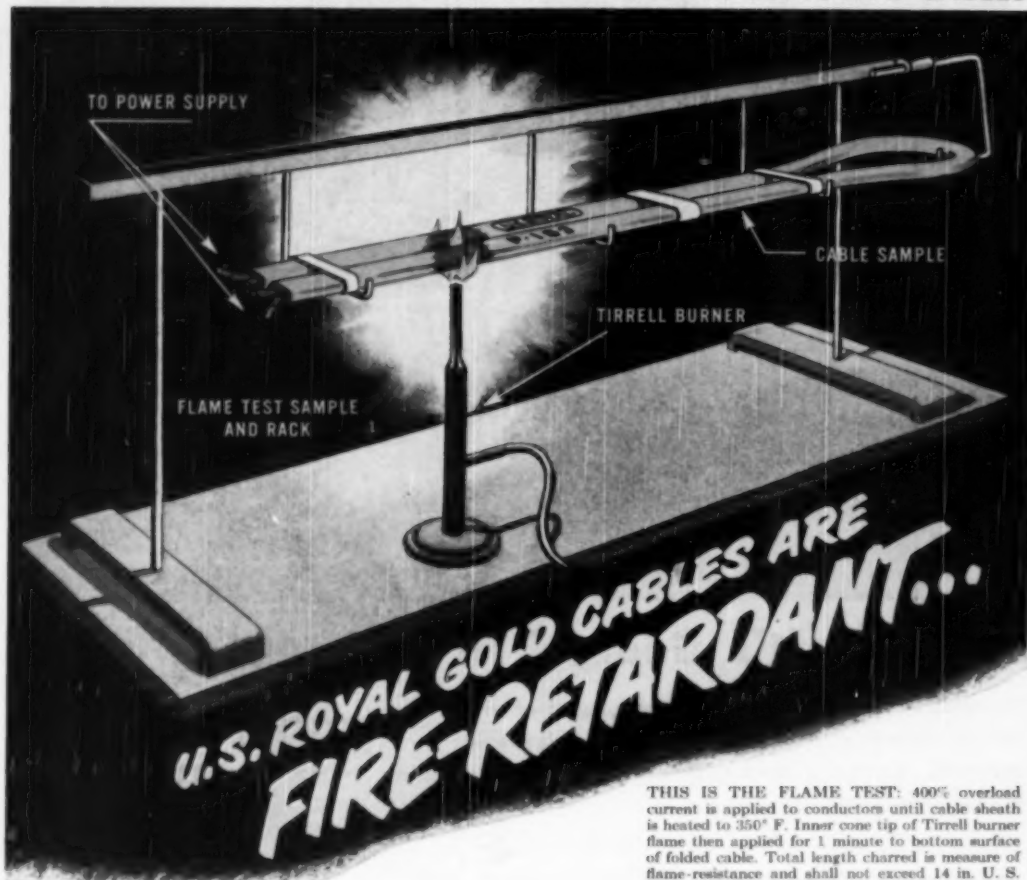
4

Faster Reverse Speeds

Quick Shuttle-Action Forward-Reverse Shift



U. S. ROYAL GOLD MINING MACHINE AND LOCOMOTIVE CABLES



THIS IS THE FLAME TEST: 400% overload current is applied to conductors until cable sheath is heated to 350° F. Inner cone tip of Tirrell burner flame then applied for 1 minute to bottom surface of folded cable. Total length charred is measure of flame-resistance and shall not exceed 14 in. U. S. Royal Mining Cables pass test with extra margin of safety.

7 Reasons Why These Yellow Jacket Cables Mean Safety!

A severe Flame Test must be passed by U. S. Royal Cables before they are approved as "Fire Retardant" by U. S. Rubber engineers. They bear the Label P-103, given by the Pennsylvania Department of Mines in token of conformity with their strict fire prevention regulations. Six other gruelling tests guarantee U. S. Royal's resistance

to abrasion, cutting, moisture, cold, impact and flexing. The bright yellow color gives U. S. Royal Gold the highest visibility. Available also in black. For descriptive folder write Electrical Wire and Cable Dept. United States Rubber Company, Rockefeller Center, New York 20, N. Y.



PRODUCT OF



UNITED STATES RUBBER COMPANY
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Ask any user... you'll find them everywhere

In scores of industries, users of Wickwire Rope have developed an affectionate respect for its performance, safety and long life. And, for true economy, they use Wickwire's WISCOLAT[®] Preformed. It lasts longer — is easier to cut, splice and install. It's kink-resistant and safer to handle. Wickwire Distributors and Rope Engineers, in key cities everywhere, are prepared to render prompt service in meeting your wire rope needs. Wickwire Rope Sales Office and Plant — Palmer, Mass.

ON THE EAST — Wickwire Rope Sales Div. of C. F. & I., 230 Fifth Ave., New York 10, N. Y.
ON THE MOUNTAIN — The Colorado Fuel and Iron Corp., Cripple Creek, Colo.
ON THE WEST COAST — The California Wire Rope Co., 10301-10th Ave., Oakland 4, Cal.



TRANSPORTATION



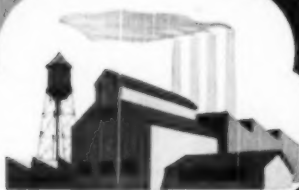
LOGGING



MINING



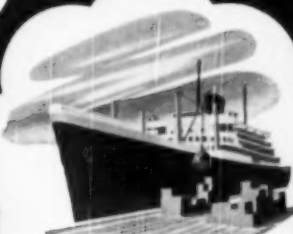
PETROLEUM



MANUFACTURING

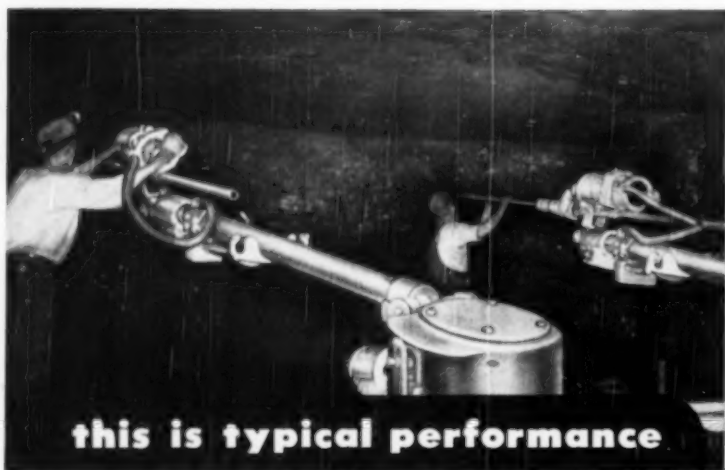
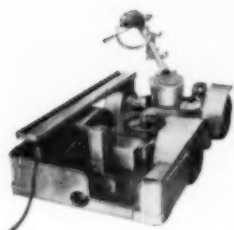


CONSTRUCTION



MARINE

CP Tramdrill for trackless mines



of CP Drill Arms

- Eighty $4\frac{1}{2}$ inch diameter, 8-foot holes per shift; working ten 22-foot places per shift, and in each place drilling four holes in rock and four in coal.
- Ninety-six $2\frac{1}{2}$ inch diameter, 8-foot holes per shift; working sixteen 22-foot places.
- Eighty-eight $1\frac{1}{8}$ inch diameter, 6-foot holes per shift, entirely in rock; working twenty-two places. Drilling time per hole 45 to 50 seconds.
- Eighty $2\frac{1}{2}$ inch diameter, 8-foot holes per shift; working ten 22-foot places. Development work, in each place drilling four holes in rock and four in coal.

Designed for installation on a CP Tramdrill for trackless mines, the versatile CP Drill Arm can also be mounted on a truck or mine locomotive.

Write for detailed information.



PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Among the Manufacturers

John S. Shaw, director of safety of Hercules Powder Co. since 1941, retired Jan. 1, the company recently announced. A veteran in the explosives and chemical industries and active as a pioneer in the field of industrial safety, Mr. Shaw was with du Pont from 1906 until 1913, when on the dissolution of the old du Pont company, he was transferred to Hercules. Following extensive production experience, Mr. Shaw became a member of the company's industrial research department in 1919 and was named manager of the safety and service department in 1925.

Dr. Zay Jeffries, vice president of the General Electric Co. in charge of the Chemical Department, has retired. A pioneer and leader in the fields of chemistry and metallurgy, Dr. Jeffries during the war was vice chairman of the War Metallurgy Committee and chairman of two of its subcommittees. He also served as consultant for the University of Chicago metallurgical laboratory, part of the Manhattan Project for research and development work on the atomic bomb. Dr. Jeffries joined General Electric in 1914 and was elected a vice president in 1945.

The Joy Mfg. Co., Pittsburgh, Pa., has appointed Paul M. Barlow manager, mining sales, Mines Equipment Div. Mr. Barlow, a 1932 graduate of Carnegie Institute of Technology, spent 11 years as an electrical engineer with the West Virginia Engineering Co., the West Virginia Department of Mines and the Carbide & Chemical Corp. He then joined the Mines Equipment Div. as a sales engineer.

S. W. Rolph, executive vice president, The Electric Storage Battery Co., Philadelphia, has been elected president, effective Jan. 1, to succeed R. C. Norberg, who has been elected chairman, board of directors.

Vascoloy-Ramet Corp., Waukegan, Ill., and Carbit, Inc., Pittsburgh, Pa., have announced new arrangements for sales and service throughout the eastern coal fields, under which Carbit, Inc., will now sell and service, exclusively, Vascoloy-Ramet mining-tool products. Carbide coal-tool stocks are now carried by the above tool concerns in Pittsburgh, Pa., and at eight other points in the eastern coal fields.

Heyl & Patterson, Inc., Pittsburgh, Pa., has appointed Orville R. Lyons as coal preparation engineer. For the last 4 yr, Mr. Lyons has served as research engineer in charge of coal preparation at Battelle Memorial Institute, Columbus, Ohio.

George L. Draffan, president, Ohio Brass Co., has been elected to the board of directors of the National Association of Manufacturers for the year 1950 and will represent the Central Ohio district. Mr. Draffan has been actively interested in NAM affairs and is now serving as a member of the organization's Community Leaders' Committee. He is also a vice president and trustee of the Ohio Manufacturers' Association.

National Mine Service Co., has appointed T. T. Pattison district manager in charge of all sales and field operations of the company in Illinois, Indiana and Western Kentucky. Mr. Pattison also will have supervision of the Western Kentucky Div. office and warehouse in Madisonville, Ky., and will continue to make his headquarters in Benton, Ill., where he formerly was sales representative for the firm. For 22 yr prior to his association with National Mine Service Co. in July, 1947, Mr. Pattison represented Hurlburt Oil & Grease Co.

Myron R. Coughenour has been appointed engineering manager of the Connellsville Mfg. & Mine Supply Co., Connellsville, Pa., succeeding W. L. Pritts Jr., resigned. Mr. Coughenour returns to the Connellsville organization after having served 22 yr with the Pittsburgh Consolidation Coal Co. and the Fairmount Machinery Co. in various engineering capacities.

W. B. Shirk has been made director of industrial products engineering in the newly-formed product-development and product-engineering section of the Gulf Oil Corp., Pittsburgh, Pa. Mr. Shirk, who recently has been serving as chief industrial lubrication engineer in lubricating sales, will supervise the application of fuels and lubricants to prime movers and industrial plants.

Central Mines Equipment Co., St. Louis, Mo., has two new distributors: the Drillmaster Supply Co., 1307 N. First Ave., Evansville, Ind., and the Mobile Drilling Co., 916 N. Pennsylvania Ave., Indianapolis. Elmer Huckhold and Carl Temme have been appointed joint managers of production at the company's St. Louis plant.

Robert C. Hood has been elected president, Ansul Chemical Co., Marinette, Wis., succeeding his brother, F. James Hood, who died suddenly in New York Nov. 10. The new president, who has been associated with the company for 10 yr, was named vice president less than 2 yr ago. Ansul also created a dual vice-presidency. Sales Director Leonard C. McKesson was named vice president in charge

of sales and Arthur C. Pope was elevated to vice president in charge of manufacturing.

J. M. Donahue, vice president, Mack-International Motor Truck Corp., New York, has been named manager of the company's Atlantic division, with headquarters in Philadelphia. In his new capacity, Mr. Donahue, who joined the company in 1924, will direct all Mack sales and service activities in Pennsylvania, Delaware, Maryland and the District of Columbia.

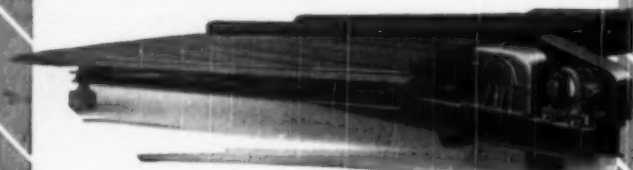
E. A. Trask, former head of the San Francisco office of John A. Roebling's Sons Co. of California, became manager of sales of the company's Chicago corporation on Jan. 1. G. C. Bukowsky, former manager of the Portland, Ore., branch, has succeeded Mr. Trask. Both men are 25-yr veterans of the company.

Fairbanks, Morse & Co., Chicago, has appointed R. L. Van Alstyne, associated with the company for 29 yr, manager of all scale factories. His duties include the administration of the new scale development and research department, as well as the supervision of both the St. Johnsbury, Vt., and East Moline, Ill., scale factories. Several changes in the sales organization recently announced by Fairbanks, Morse include the transfer of J. A. Cuneo, formerly branch manager, Los Angeles, to Chicago as manager of that branch. A. M. McLaren succeeds him at Los Angeles. John S. King, formerly manager of Chicago branch, has been moved to Cincinnati, Ohio, as branch house manager of that sales area, succeeding J. S. Peterson, who has been transferred to Chicago and will be attached to the sales manager's office. William H. Kingsley, for the past 12 yr district manager of the New York office of the Ideal Electric & Mfg. Co., has joined Fairbanks, Morse to become manager of the electrical division, with headquarters in Chicago.

Link-Belt Co., Chicago, has announced the following changes in plant management personnel: Richard E. Whinrey, now assistant general manager at the company's Dodge plant, Indianapolis, will on May 1 become assistant general manager at the Ewart plant, Indianapolis. Raymond S. Wood, general manager at the Minneapolis plant, will replace Mr. Whinrey at the Dodge plant Feb. 7. Leslie J. Carson, chief engineer at the Caldwell plant in Chicago, will move to Minneapolis Jan. 15 to become general manager of the Minneapolis plant and the North Central sales division. William P. Ridsdale, chief engineer at Dallas and Houston since 1946, has returned to Chicago to become chief engineer of the Caldwell plant.

Albert I. Edwards has been named basic-industries-machinery specialist for the Allis-Chalmers Mfg. Co., Mid-Atlantic region, and William D. Busch,

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Because of its inherent efficiency, the Diagonal Deck SuperDuty Coal Washing Table makes such clean separations that re-treating of either the washed coal product or the refuse is never necessary.

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For full information about this profitable table, write for bulletin 119.



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former crusher-sales application engineer in the company's basic industries machinery department, has been appointed to the Youngstown, Ohio, district office as a sales representative.

Robert G. Holmes has been appointed branch manager of the Chicago sales office of Morse Chain Co., Division of Borg-Warner Corp. Mr. Holmes has been a sales engineer in the Chicago and St. Louis areas for the past 12 yr.

American Brake Shoe Co. has transferred Paul L. McCulloch Jr. from Rochester, N. Y., to the Pittsburgh, Pa., district sales office, where he will serve as sales engineer for the American Manganese Steel and Electro-Alloys Div. of the company, replacing M. A. Zeller, resigned.

J. H. Berryman has been appointed assistant to Scott D. Baumer, manager, technical-sales division, Air Reduction Sales Co., with responsibility for the technical promotion and sales of equipment for the recently introduced Airomatic welding process.

Raymond G. Lawry, 70, died Dec. 25 at Passavant Hospital, Chicago. A graduate of Kansas State College, Mr. Lawry was associated for the past 40 yr with Roberts & Schaefer Co. and was instrumental in the development of equipment for the coal-mining industry in the Middle West.

Westinghouse Air Brake Co., Wilmerding, Pa., has formed an Industrial Products Div., in which development, promotion and marketing of all products outside the railway field will be grouped. Promotion of air compressors and pneumatic controls will be expanded and extended by the new division, which will be headed by A. J. Bent, field sales manager; J. P. Cooper, headquarters sales manager; and R. R. Stevens, industrial engineering manager.

The Joy Mfg. Co. is planning to build a large shop and office building on its property at Franklin, Pa. The firm recently closed its Breckenridge plant in Cleveland and facilities of that plant are to be housed in the new Franklin plant. Construction is expected to get under way in the early spring.

Pennsylvania Crusher Co., Philadelphia, has appointed the Wharton L. Peters Machinery Co., St. Louis, a sales representative for Missouri and the southern counties of Illinois and Indiana.

Joe T. Barton, 208 College St., Montgomery 5, Ala., has been appointed Alabama sales and service representative for the D-A Lubricant Co., Inc., Indianapolis.

Moorhead Electrical Machinery Co., Inc., has moved its offices from 30th & Brereton Sts., Pittsburgh, to newly constructed quarters at Oakdale, Pa. For the past 20 yrs the company

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Shaft cable puts in a rough day's work. The speeding cage vibrates the shaft timbers and guides; sharp-edged, heavy chunks of coal and rock carom back down the shaft walls. Yet Hazard Armored Shaft Cable has been taking this daily punishment for years in many mines — and is still going strong without any failure.

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Cable suspended securely by individual steel armor wires at top of shaft.

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Choose Armco STEELOX Buildings for head houses, cap storage, utility buildings and all your mining needs. Write us for complete data. Armco Drainage & Metal Products, Inc., 2290 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation.

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ARMCO STEELOX BUILDINGS



has operated a shop and warehouse at Oakdale, with offices in Pittsburgh. By consolidating all activities, including offices, shop and warehouse at the Oakdale property, the company expects to materially improve its service, especially when handling the heavier class of electrical machinery. Overhead cranes have been installed and the shop facilities have been greatly improved, the company reports.

Rome Cable Corp., Rome, N. Y., has opened a new warehouse in Salt Lake City, Utah, stocking a complete line of insulated wires and cables, thus offering the area improved service. The Salt Lake City office is located at 230 S. Fourth West, Zone 1, and is in charge of H. L. Rawlings.

The recently completed brick and steel additions to the Chicago plant of Joseph T. Ryerson & Son, Inc., provide approximately 118,000 sq ft of modern plant and office space, the company has announced. The construction included a two-story office building and a plant used principally to warehouse bar and sheet steel and tubular-steel products. The addition to the firm's steel service facilities in Chicago represents the first major construction to be completed in a series of planned expansion and modernization moves which ultimately will take in the entire property.

Fafnir Bearing Co., New Britain, Conn., has expanded its warehouse facilities in the Philadelphia area with acquisition of a building at 4006 York Rd. The structure now houses Fafnir's branch office and warehouse stock, providing several times the area formerly available. Thomas A. Savage and Charles Haefner are Philadelphia manager and assistant, respectively.

R. D. Travers Co., Canadian representatives for the Cambridge Wire Cloth Co., has announced that it now is settled in new and larger quarters at 117 Charlton Ave., West Hamilton, Ont.

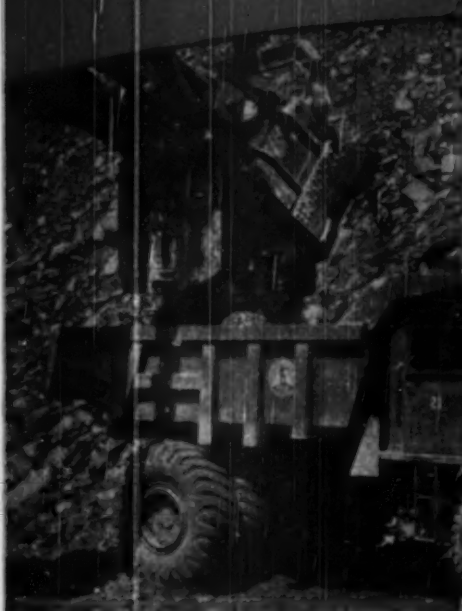
Gumout Div., Pennsylvania Refining Co., Cleveland, Ohio, has appointed new sales representatives for Penn Drake Gumout, as follows: L. H. Cox Associates, 626 Erie St., Minneapolis; F. Somers Peterson Co., 524 Folsom St., San Francisco; James H. Page, 827 Locust St., Denver; Winkenweder & Ladd, 1421 S. Michigan Ave., Chicago; Rice Bros., Portland and Seattle; E. M. Arnold, Pittsburgh; and Schade Sales Co., 407 Chester Ave., Moorestown, N. J.

Herbert G. Kieswetter has been named assistant general manager of the mechanical-goods division, United States Rubber Co., New York. Mr. Kieswetter formerly was vice president and assistant general manager of United States Rubber Export Co., Ltd., which he joined in 1925.

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NLRB Asks Show-Cause Order Against UMWA As Miners Defy Back-to-Work "Request"

ROBERT N. DENHAM, general counsel, National Labor Relations Board, asked a federal court Jan. 18 to order the UMWA and its officials to show cause why the three-day week and their contract demands should not be enjoined. The NLRB suit cited as unfair labor practices the union's insistence on the "able and willing" and union-shop clauses, charged that the welfare-and-retirement fund setup discriminated against non-union workers and accused the union of using the three-day week wrongfully to enforce contract demands. Most operators had hoped the NLRB would ask for an immediate injunction.

Mr. Denham's move followed the urgings of coal operators and promised to head off a spreading stoppage that gripped eastern fields and idled nearly 90,000 miners by Jan. 18. The spreading no-day week was the result of votes by scattered union locals in key areas. They waved aside Mr. Lewis' "suggestion" of Jan. 13 that the checkerboard pattern of harassing strikes end and that the miners stick to their three-day week. In meetings Jan. 14 and 15, locals in Pennsylvania, West Virginia and Ohio voted to stay away from work altogether until a new contract could be written. Having voted, they then fanned out far and wide as pickets, shutting down mines that otherwise would have stayed open. On Jan. 23, though some locals had voted to return to work, 50,000 miners still were idle in eastern bituminous fields.

Union officials, using sound trucks and radio announcements, went through the motions of getting miners back to work but with little success. Main targets of the stoppage appeared to be the big "captive" operations of U. S. Steel Co. and mines of Pittsburgh Consolidation Coal Co.

Meanwhile, anthracite wage talks continued without progress in New York City and conferees on both sides indicated little hope of an early settlement. Anthracite miners, like most bituminous workers, held to a three-day work week.

nation-wide agreement into regional contracts.

Federal Action Asked

For some weeks prior to mid-January, operators and operator associations urged the NLRB to seek an injunction. In formal complaints filed with the NLRB, they cited the union's insistence upon the "able and willing" and "memorial-period" clauses, the union shop and the welfare-fund provisions, and alleged that the three-day week was a brand of coercion designed to force the operators to sign a contract on the union's terms alone. They also pointed out that the union-shop clause had been held illegal in an earlier NLRB decision, the UMWA having failed to conduct an election within the terms of the Taft-Hartley Act.

An injunction obtained by the NLRB would be made effective as long as it takes the board to hear and rule on the operators' charges. An injunction under the Taft-Hartley Act would last only 80 days and would involve appointment of a fact-finding board without power to make recommendations.

The NLRB suit would take some of the heat off President Truman, who turned down the urgings of operators, retailers and some congressmen, including Senators Lucas, Illinois, and Jenner, Indiana, that he invoke the Taft-Hartley Act. Along with UMWA officials, the President insisted there

Why the Walkouts?

Speculation among bituminous operators regarding the spreading stoppage in mid-January followed three lines: (1) the miners, impatient with their leaders, their employers, flat pay envelopes and the lack of any progress toward a contract, started a no-day work week to force a show-down; (2) Mr. Lewis was pulling the backstage strings in an effort to show that the miners really are independent and that he is not a labor dictator; and (3) with non-union and PMWA workers drawing full pay while most UMWA miners drew three-day pay or none at all, discipline was breaking down and the union's solid front was broken. Though this last view was held by few, those who held it saw some hope for writing a reasonable contract with splinter elements of the UMWA and thus breaking down the



THIS MONTH'S COVER shows you the coal-washing plant at the new Robena mine of the H. C. Frick Coke Co., the largest underground operation in the world. The new plant will prepare high-grade metallurgical coal for shipment down the Monongahela River to U. S. Steel blast furnaces.

COMING IN MARCH

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AC Ground Protection—Improved system

for better electrical protection at Otsego.

Promoting Anthracite Safety—The U. S. Bureau of Mines program at work in anthracite.

Electric Heating Serves Coal—Where it can be used and what it does.

Alloy Steel for Lower Preparation Maintenance—Program and expected results at new J. & L. plant.

Mechanical Mining—Case histories of new techniques for higher efficiency.

Efficiency at Joliana—Stripping and heavy-media preparation.

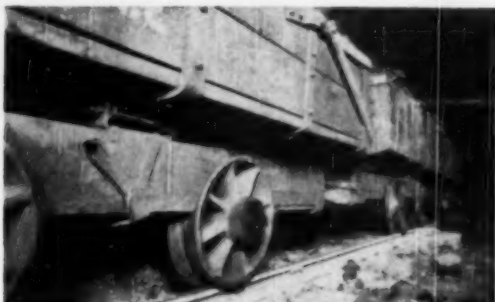
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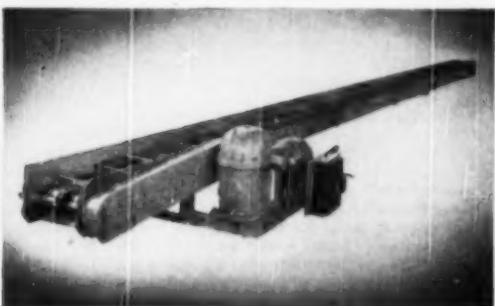
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was no national emergency. Meanwhile, the Duquesne Light Co., Pittsburgh, warned industries that power probably could not be provided unless mining soon was resumed, and the railroads, complying with Interstate Commerce Commission orders of Dec. 23 and Jan. 5, continued to seize coal from mines along their tracks and cut over 650 coal-fired trains from their schedules. Also, Youngstown Sheet & Tube Co. announced Jan. 12 that it would start banking blast furnaces Jan. 23 unless coal could be obtained. Youngstown was the first of the big steel companies to threaten a cutback.

Question Stocks on Hand

Retailers in many cities and towns in the East and Midwest reported that they were down to one to four days' supply. Joseph E. Moody, president, Southern Coal Producers' Association, estimated coal stocks on hand on Jan. 12 at only 23,202,000 tons, the lowest point in 15 yr. However, the Department of the Interior reported that supplies of bituminous received by household and other retail customers during the last four months of 1949 were substantially higher than in the same period in 1948. Retailer deliveries in December, 1949, were estimated at 11,445,000 tons. Likewise, Interior officials declared that electric utilities' supplies averaged 87 days and railroad stocks 24 days.

Meanwhile, the Senate Labor Committee agreed Jan. 13 to a public hearing on a Republican-sponsored resolution urging the President to invoke the Taft-Hartley Act in the coal dispute. Senator Taft, Ohio, and Senator Ferguson, Michigan, joined with five other Republicans in sponsoring the resolution. No date was set for the hearings. Earlier, on Jan. 10, the Senate Banking and Currency Committee recommended an early study to determine whether anti-trust laws should be made applicable to labor unions. Senator Robertson, Virginia, chairman of the subcommittee that held monopoly hearings last summer, said he would introduce a bill Jan. 23 to extend anti-trust laws to unions.

Suits Plague Union

The union was not without its troubles. In Ohio, Jan. 6, damage suits totaling over \$11,000,000 were filed by eight large coal operators against the UMWA and its officials. The operators asked double damages for losses suffered because of previous 1949 strikes and curtailed work weeks. The suits were entered under the 40-year-old Valentine anti-trust law, which prohibits any group from interfering with the production of any commodity. Complainants were Pittsburgh Consolidation Coal Co., Y. & O. Coal Co., Jefferson Coal Co., Cadiz Mining Co., New York Coal Co., Lorain Coal & Dock Co. and Powhatan Mining Co. Sunnyhill Coal Co., Pitts-

Featured in This Section

Personal Notes	p 150
Coal and Business Activity	p 155
Coal Mining Institute Meet.	p 158
Kentucky Mining Institute	p 160
New Developments	p 180
Association Activities	p 181
Obituaries	p 181
Foreign Developments	p 183
Preparation Facilities	p 185
Coal Publications	p 185

burgh, filed an individual petition some hours later, asking for an injunction and \$1,150,000 damages. In a new twist, an Ohio operator who signed the new UMWA contract was named co-defendant with Mr. Lewis and the UMWA in a \$5,672,000 damage suit brought by four large operators. Later on Jan. 16, four Kentucky operators filed suits totaling \$177,400, alleging damages from the three-day week since Dec. 5.

A somewhat similar suit, asking \$20,000 damages, was filed by an Ohio retailer, Davis Coal Co., Dayton, which charged the union with limiting coal production since Oct., 1949. This was the first action by an Ohio retailer growing out of the coal controversy. Vaughn Thorne, executive secretary, Ohio Coal Conference, Inc., served notice that other retailers "may" file similar suits.

Strikes Hit Many Mines

Scattered outbreaks of violence accompanied the three-day week and the checkerboard pattern of strikes, the latter being felt in Illinois after New Year's Day, and the following week and thereafter in eastern fields. In Wellsburg, W. Va., warrants were obtained Dec. 22 against five Pennsylvania men charged with beating a non-union strip-mine superintendent. Near Imperial, Pa., roving pickets smashed windshields of coal-hauling trucks and dumped coal on the roadside in an attempt to enforce the three-day work rule on non-union operations. Near Collins, W. Va., pickets forced men to stop work at a strip mine and near Page, Ky., a 48-year-old Virginia miner was beaten by masked men in retaliation for letters he had written criticizing Mr. Lewis. Near Bluefield, W. Va., nine men were indicted in connection with coal-truck dumping.

In addition to the large-scale shutdowns that idled over 80,000 miners in the East, minor disputes, some without apparent reason, closed mines in widely scattered regions. Seven mines of Clinchfield Coal Corp., in Virginia, were reported idle for six days beginning Jan. 9 in a union drive to force the company to renew a lease with an independent trucker who had signed the new UMWA contract. Near by, at Dixiana, Va., 250 men staged an unexplained strike at plants

of Coal Processing Corp. At Logan, W. Va., Mines Nos. 1 and 23 remained closed after Christmas in a dispute over reassignment of tippie crews. A tippie dispute likewise provoked a strike after Christmas at mines of H. E. Harman Coal Corp., Harman, Va. Though the dispute supposedly was settled, the men still failed to show up for work. At Paintsville, Ky., 1,100 men at two coal-loading tipples walked out Dec. 20 in a dispute over wages paid to truck-tippie workers, contending the pay did not meet the standards of the new UMWA contract.

Union Wins Few Signers

Though large producers and producer associations held fast to their refusal to sign a contract on Mr. Lewis' terms, UMWA officials from time to time announced new agreements in Virginia, West Virginia, Pennsylvania, Illinois, Oklahoma, Arkansas, Colorado and Iowa. Most of those who signed were reported to be small truck operators. Union officials, were reluctant to discuss all the terms of the newly signed contracts. It was estimated that total output by non-union and PMWA miners, plus that by employees of mines working under the new agreement, was no more than 2,000,000 tons per week.

One new development in contract offers was revealed Jan. 12, when Ben Moreell, president, Jones & Laughlin Steel Corp., offered to settle with the company's 5,000 miners on the terms of the steel-strike settlement last fall. Mr. Moreell declared that the company "wants its miners to receive the same dependable pension, insurance and social benefits as all our other employees." The J. & L. steel settlement provided for a non-contributory pension equal to about 10c per hour and an insurance plan with workers and company each contributing about 2½c per hour. John Busarello, president, UMWA District 5, dismissed the proposal.

Elsewhere, at Huntington, W. Va., the Chamber of Commerce issued invitations Jan. 7 asking presidents and managers of the chambers of commerce and boards of trade within the state to meet Jan. 17 to study the coal situation. Aim of the conference was to form a program of action looking to restoration of normalcy in the coal fields. Without attempting to fix the blame for current upheavals, sponsors hoped to achieve "a thoughtful meeting of minds," said John Berthold, chairman of the conference committee.

Goaded by union tactics and driven by economic pressures, several company-owned stores in mining towns began shutting down credit to miners in January. Credit extended up to Jan. 16 was estimated at some \$60,000,000. Store managers reported that their suppliers no longer were able to extend credit for goods to stock their shelves.

Personal Notes

G. B. Fillmore, Cadwallader Evans Jr. and Edgar C. Weichel figured in top-level changes recently announced by The Hudson Coal Co., Scranton, Pa. Mr. Fillmore, formerly senior vice president, was elected president Dec. 27, succeeding Mr. Evans, who resigned effective Jan. 1, 1950. Edgar C. Weichel, general manager, was elected vice president. Mr. Fillmore has been with The Hudson Coal Co. since 1919, moving up through positions as special engineer, chief inspector, assistant general sales agent, general sales agent, vice president and senior vice president. He served with the Solid Fuels Administration during World War II. Mr. Evans, president of the company since 1946 and vice president and general manager prior to that, is continuing his connection with the company as a director and as its consulting engineer. On Jan. 2, he opened an office for general consulting engineering in Scranton. Prior to his long affiliation with The Hudson Coal Co., Mr. Weichel was with the Pennsylvania Coal Co., Scranton. The promotion of John M. Reid from general superintendent of mines to general manager, to succeed Mr. Weichel, also has been announced. Mr. Reid has been associated with Hudson for the past 25 years in various supervisory positions and had been general superintendent of mines for the last 5 years.

William E. Weineck retired Dec. 31 as superintendent, Glen Lyon Colliery, Susquehanna Collieries Div., M. A. Hanna Co., Nanticoke, Pa. Mr. Weineck had been with Susquehanna and its predecessor companies for 53 yr, having started work in a breaker at



CADWALLADER EVANS JR. has resigned as president of The Hudson Coal Co. and has opened an office in Scranton as a consulting engineer. Mr. Evans also will continue his association with Hudson, serving as a director and as its consulting engineer.



ROBERT C. NORTON has been elected chairman of the board, Oglebay Norton & Co., Cleveland, Ohio, succeeding the late Crispin Oglebay. Mr. Norton was vice president and treasurer of the company for many years and was made vice chairman in July, 1949. Also, Alfred M. Rankin, a director of North American Coal Corp., Cleveland, has been elected a director of Oglebay Norton.

the age of 12. In succession, he was master mechanic, machinery inspector, superintendent of construction and engineering and superintendent of the company's Wyoming division. He had been superintendent of the Glen Lyon operation since 1932.

A. Finley Harper, mining engineer, Birmingham, Ala., has been named chief, Safety and Inspection, Alabama Industrial Relation Division, succeeding the late T. L. Ball, who served in that position until his death several months ago. Until recently, Mr. Harper was superintendent, Consolidated Coal Co., Walker County, Ala.

Robert W. Hanna has been elected president, Virginia & Pittsburgh Coal & Coke Co., Nite-Barnes Coal & Coke Co. and Edna Gas Coal Co., Fairmont, W. Va., succeeding the late R. M. Hite.

Changes recently have been announced in the management of the Powellton division, Eastern Gas & Fuel Associates, Powellton, W. Va. Eugene W. Potter, formerly production engineer, has been made superintendent, Powellton No. 6 mine, succeeding Elmer E. Stephens, who has retired. Mr. Potter joined the E. G. & F. A. Pittsburgh staff in 1935, after wide experience as transitman and draftsman. Later he was assigned to field engineering duties. Mr. Stephens had been with E. G. & F. A. Coal Div. since 1922 and had served as superintendent of the Beard's Fork and Powellton mines. Foremen of the Powellton No. 6 mine honored Mr. Stephens and Major A. W. Fluegel, who also retired as mine foreman, with a dinner shortly before their re-

tirement. Both men were presented with leather luggage as a parting gift. P. C. Robbins, Powellton division engineer, also retired recently after more than 25 yr with the company and 9 yr prior experience with other coal companies as rodman, transitman, draftsman and engineer.

E. R. Price, general manager, Inland Steel Co., Wheelwright, Ky., has been elected a member of the board of trustees, Berea College, Berea, Ky., and the Pine Mountain Settlement School, Pine Mountain, Ky.

Carl Dann, formerly an official at No. 155 mine, Consolidation Coal Co. (Ky.), McRoberts, Ky., has been made superintendent, Winters mine, Faraday, Ky., succeeding Robert Collins.

J. B. Warriner has resigned as chairman of the board, Lehigh Navigation Coal Co., Lansford, Pa., a position he has held since December, 1947, and has been elected senior director. The position of chairman of the board has been abolished. Mr. Warriner will continue his activities in research and planning and as a member of the Anthracite Board of Conciliation.

Robert W. Whitaker, formerly sales manager and assistant general manager, Anchor Coal Co., Cleveland, has been elected vice president and general manager of the company.

Jim Hutton has been named resident engineer, Moffat Coal Co., Sparta, Ill., to succeed his father, John Hutton, who died suddenly Dec. 29.

F. S. Mulock, vice president and general manager, western operations, U. S. Smelting, Refining & Mining Co., has been named president of the U. S. Fuel Co., Salt Lake City, succeeding M. H. Kuryla. S. J. Craighead will continue as vice president and general manager of U. S. Fuel. Mr. Mulock will have his offices in Boston, where he will serve as vice president in charge of operations for the smelting company. In March, he will become president of the company, succeeding Mr. Kuryla, who is retiring.

William H. Barrett, executive assistant to the president, and Stanley R. Johnson Jr., operating assistant to the president, have been elected directors of the Lorain Coal & Dock Co., Cleveland. Martin J. Lucki, tipple foreman, has been promoted to coal preparation foreman at Blaine mine.

Russel D. Squibb, general superintendent, Youghiogheny & Ohio Coal Co., has been named general manager for the West Virginia operations of the Truax-Traer Coal Co., Kayford, W. Va., succeeding J. E. Chamness, who has been assigned to other expanded executive duties.

L. J. Timms, formerly general superintendent, Ebensburg Coal Co., Colver, Pa., has been named assistant to the president, Premier Pocahontas Collieries Co. and Eastern Coal Corp.

IN MORSE CODE . · · — — · · · MEANS HELP EVERYWHERE

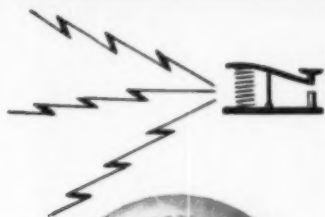
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In the temporary office at the new Weirton mine, Weirton Steel Co., Morgantown, W. Va.: Charles Turley (standing, left), general mine foreman; William Davidson, office clerk; R. A. Sutton, chief clerk; Clay Huffman, outside foreman; Harry Theakston, master mechanic; C. E. Fell, chief supply clerk; C. W. Thompson (seated, left), assistant manager, Weirton Coal Co.; and J. L. Willits, superintendent.

COAL MEN



T. Laine, general mine foreman; K. Bruce Myers, master mechanic; and A. T. Swelbar, foreman, Pit No. 46A, Georgetown No. 12 mine, Hanna Coal Co., Georgetown, Ohio.



H. Thomas Douglas (left), personnel manager, and James P. Collins, safety director, Warner Collieries Co., Cadiz, Ohio.



Harry Moore (left), W. J. Pysell, R. E. Coro and Carl DuBois, mechanics, with C. D. Campbell (right), chief electrician and master mechanic, Bunker mine, Trotter Coal Co., Cassville, W. Va.

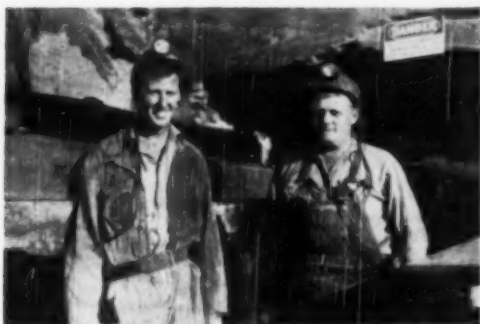


J. H. Gwynne, laboratory technician, Arkwright preparation plant, Christopher Coal Co., Granville, W. Va.



At Elk Horn No. 28 mine, Elk Horn Coal Corp., Wayland, Ky.: C. T. Wallace (standing, left), preparation engineer; Edgar Dale, assistant general superintendent for the company; Frank Smith, coal-preparation engineer, and E. J. Woltz, sales engineer, Jeffrey Mfg. Co.; Buck Layne, tipple foreman, and George Burks, preparation engineer, Middle Fork Coal Co.; N. D. Howard (front, left), chief engineer, Elk Horn Coal Corp.; and M. M. McCormick, superintendent, Fairfax operations, Sovereign Coal Co.

ON THE JOB



John K. Berry (left), production engineer, Consolidation Coal Co. (Ky.), and R. C. Collier, general mine foreman, Hendrix mine.



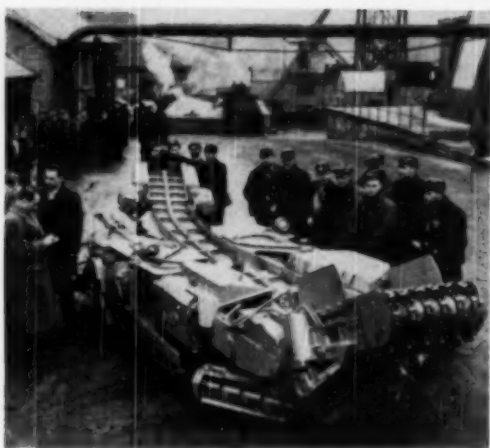
K. L. Wood (left), engineer; Luis Jordan, chief engineer; and Charles R. Heidleback, safety director, Rail & River Coal Co., Bellaire, Ohio.



William Poundstone, 1949 West Virginia University graduate, at work in the Arkwright preparation-plant laboratory.



Charles Cyphert (standing, left), maintenance foreman; George B. Flagel, chief mining engineer for the company; Stanley Goodrich, general mine foreman; and H. A. Hines (seated), superintendent, Mine No. 3, Christopher Coal Co., Osage, W. Va.



BRITISH PLANER (left) and continuous miner from United States . . .

Speed Coal-Mining Progress in Great Britain

Two machines new to the British coal-mining industry recently have been installed with the hope that they will boost tons per man-day, bring costs down and provide enough coal to ease rationing at home. The Samson Stripper, shown above (left) in a South Wales mine, is a coal planer much like the German coal plough. After extensive tests in British mines, it now is reported to have reached the stage where the final prototype can be built. The planer, weighing 10 tons and driven by a 20-hp motor,

drives a wedge along the face to plane the coal down. A steel plate deflects the broken coal to a chain conveyor lying between the machine and the first row of props. Experts estimate that the planer might be useful in 40% of national output, saving about 30% of face labor where it is used. Further savings would result from elimination of explosives and waste and concentration in the best seams and mines.

The first Joy 3-JCM Continuous Miner to leave the United States is

shown above (right) at the Donisthorpe Colliery, near Swadlincote, some 25 mi northeast of Birmingham. The Donisthorpe mine, one of the show-places of the National Coal Board, was chosen as the logical place to try out the machine. Earl Bradley, Joy serviceman, Staunton, Ill., seen talking to reporters at the left in the photograph above, was sent to England to give supervisors and workers a complete course in operation and maintenance. The unit will load Joy 42-D battery shuttle cars.

Pittsburgh Consol Closes Gas Pilot Plant

The large gasification pilot plant of Pittsburgh Consolidation Coal Co., Library, Pa., was shut down Jan. 6 after operating for more than a year on a round-the-clock basis. Company officials declared that the plant has proved its ability to make from caking coal a synthesis gas suitable for conversion to oil and gasoline. At the same time, they promised an even more vigorous exploratory research program on coal-conversion processes in the future, pointing out that the company's appropriations for this work in 1950 are greater than the budget for this purpose in 1949.

Explaining the shutdown of the pilot gasification plant, George H. Love, president of the company, declared, "The commercial prospects of financing and building a large plant to convert coal to gasoline are far less attractive today than they were when we started this work. In fact, they are so bad, from an economic standpoint, that we see no reason to carry on this particular work further at this

time." With success of a full-scale plant dependent on cheap coal and uninterrupted supply. Mr. Love pointed out that the UMWA curtailment of production and its insistence upon raising the cost of coal had forced the company to abandon its plans for further construction.

As a case in point, Mr. Love cited the company's big Disco plant, completed early in 1949. This plant never has been able to operate at full capacity for an extended period and probably will have to be closed down soon because of short supplies of coal. The Disco plant was built at a cost of several million dollars to provide a smokeless fuel for Pittsburgh and other cities and towns. The same thing could happen to a costly gasification plant, he implied.

"We plan to continue and even to expand our laboratory and exploratory research at Library with the hope and expectation that sometime in the not-too-distant future the UMWA will take a more enlightened view of the entire coal situation. Then perhaps we may be justified in taking the next steps in a large-scale development program looking to the commercial-


ization of a coal-to-gas-to-gasoline plant," Mr. Love concluded.

In a statement issued at the same time, Joseph Pursglove Jr., vice president for research and development, reported that pilot-plant operation had developed new and valuable data looking to commercial production of fuel or synthesis gas directly from coal. Such problems as remain will require laboratory-scale work, he pointed out. For this work, the company will retain a staff of over 100.

Truman Bans Split Of St. Lawrence Project

Development of power on the St. Lawrence River without seaway development will not win his approval, President Truman said recently in a statement in which he urged nationwide development of hydroelectric power by the government. The President pointed out that power projects would give benefits primarily to New York State and Ontario, whereas the seaway would benefit commerce as far west as Duluth, Minn.

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Coal and Business Activity

	1950 Over 1949, to Date
Est. anthracite prod., week ending Jan. 7.....	401,000 —61.1%
Est. bituminous prod., week ending Jan. 7.....	5,530,000 —51.4%

Source: U. S. Bureau of Mines.

	Bituminous Coal Stocks (Thousands, net tons)			Consumption (Thousands, net tons)		
	Dec. 1, 1949	Days' Supply	Nov. 1, 1949	Dec. 1, 1949	Nov., 1949	Oct., 1949
Electric power utilities.....	18,508	87	19,706	24,804	6,418	6,379
By-product coke ovens.....	10,060	80	9,946	11,463	3,033	2,465
Beehive coke ovens.....	?	?	?	?	52	16
Steel and rolling mills.....	907	52	916	1,019	521	192
Cement mills.....	1,001	45	1,018	1,377	607	654
Other industrial.....	9,149	34	9,999	18,592	8,312	7,378
Railroads (Class I).....	4,094	24	4,170	9,153	5,040	4,584
Retail dealers.....	1,445	5	1,410	3,079	8,605	6,499
Total.....	45,264	39	47,165	69,579	34,886	28,008

Source: U. S. Bureau of Mines. ?Not available. †Retail dealer deliveries.

	Latest Week*	Month Ago	Year Ago
Business Week Index of Business Activity, wk. ending Jan. 14.....	195.4	190.6	197.9
Steel input operations (% of capacity).....	98.2	94.5	100.1
Electric power output (million kw-hr).....	6,029	5,997	5,727
Crude oil and cond. production (daily avg., 1,000 bbl).....	4,936	5,000	5,482
Misc. & L.C.L. carloadings (daily avg., 1,000 cars).....	65	68	73
All other carloadings (daily avg., 1,000 cars).....	40	43	48
Prices, spot commodity index (Moody's, Dec. 31, 1931 = 100).....	350.8	346.0	390.6
Prices, industrial raw materials (B.L.S., Aug., 1939 = 100).....	223.1	223.1	279.3
Prices, domestic farm products (B.L.S., Aug., 1939 = 100).....	298.9	297.0	307.4
Prices, finished steel composite (Iron Age, lb).....	3.837c	3.833c	3.720c
90 stocks, price index (Standard & Poor's Corp.).....	133.1	131.8	121.9

*Date of latest week for each series on request.

Court Action Threatens Ohio Strip Operators

More than 10% of Ohio's 250 strip-mine operators have failed to obtain state licenses for 1950 and have been ordered to quit mining coal or face court action. Z. N. Flaier, chief, Ohio Division of Reclamation, revealed Jan. 11 that letters had gone out informing delinquents that they were operating in violation of the law. Violators are subject to a fine of \$1,000 for every day of operation without a license.

License features of Ohio's new stripping law became effective Jan. 1 to all strippers who had been operating in 1949 under old-law permits. The new law calls for a minimum license fee of \$50 and a minimum bond of \$1,000 to guarantee restoration and planting of spoil banks.

Earlier on Dec. 19, some 500 UMWA members in the Arkansas-Oklahoma field had voted to do everything possible to keep the company from operating an open shop at the new mine.

Arkansas Strip-Mine Workers Vote Open-Shop

Open-shop stripping operations were scheduled to begin Jan. 3 in mines of the Ozark-Phillips Valley Coal Co., near Ozark, Ark., following a vote taken among employees Dec. 26. The work vote came after a succession of stormy meetings in which UMWA officials denied operators' claims that other mines in the Arkansas-Oklahoma district were operating an open shop. About 30

employees were reported to have taken part in the voting. Union members walked out of the meeting before the vote was taken.

Countering the union's charge that union members had been discharged in favor of non-union workers, company officials stated that certain union men had been employed to put the stripping site in repair but that they were no longer needed after their work was completed. UMWA officials declared that picketing would continue in spite of the vote.

Miners Refuse to Work With Gas-Burning Buddy

Charles Waichekauskas, employee of the Lumaghi Coal Co., Collinsville, Ill., is reported out of a job because he wants to put gas heat in a home he is building. When he reported for work Jan. 9, his fellow miners refused to work with him, and according to his wife, one of his supervisors told him it would be better if he went home. Mr. Waichekauskas contends that fumes from coal make his son violently ill. His local union, a unit of PMWA, has a by-law providing for a two-year suspension of any member using anything but coal or wood for heat. Later, on Jan. 16, John Marchando, head of the PMWA announced that he would not interfere and that the "could do nothing but sustain" the local's action.

Coal Men Sue Operator Who Signs Lewis Contract

Earl J. Jones, president and general manager, Muskingum Coal Co., Zanesville, Ohio, has been named as



Hyslop Heads Hanna Coal

JAMES HYSLOP, formerly executive vice president, has been named president, The Hanna Coal Co., St. Clairsville, Ohio, succeeding R. L. Ireland, who has held the post for a number of years. Mr. Ireland will continue to be active in the executive management of the company, serving as a director and chairman of the executive committee. Mr. Hyslop, who will continue to maintain his offices in St. Clairsville, joined Hanna Coal in 1940 as general manager. In 1943 he was made vice president and was advanced to executive vice president in 1946. Before joining Hanna, Mr. Hyslop was general manager, Walter Bledsoe & Co., Inc. Since his association with the company, and under his direction, The Hanna Coal Co. has developed into one of the largest and most progressive coal producers in the country.

one of 30 defendants in four suits seeking damages of \$5,772,000 and injunctions against the UMWA work schedules. The four suits were filed by some Ohio coal operators who allege that Mr. Jones conspired with the UMWA and union officials by signing a contract permitting his mines to work five days per week.

BCI Issues New Booklet

"Coal at Work," a new picture booklet prepared by Bituminous Coal Institute as a companion piece to "A Down To Earth Picture of Coal," now is off the press and is being distributed through BCI's educational department. The 16-page booklet was six months in production.

"Coal at Work" deals with coal utilization. The text is kept at a minimum, the story being told mostly through photographs showing how coal provides services and goods for homes, schools and industries.

Copies may be obtained from BCI headquarters, Southern Building, Washington 5, D. C., at a cost of \$5 per 100.

1950 . . .

Our Industrial Machine Is Running Down

In his recent Economic Report to Congress President Truman chalked up a constructive advance in his economic reasoning. He pointed out that if we are going to attain the worth-while goal of a \$300 billion national income in the next five years, we must equip ourselves with more and better industrial tools. Of all the dynamic forces of expansion in America, he said, one of the most important is business investment.

That is fine. It is basic common sense. We have been saying that for years and we are glad to hear the President say it too.

But having hit this new high in his economic reasoning, the President failed to draw the right conclusion. He made the mistake of accepting the false conclusion that there is no shortage of business funds to pay for more and better industrial tools. "There are immense opportunities for business investment in nearly every segment of the economy," the President said, and further, "there are in general sufficient funds available to businessmen who want to seize these opportunities."

That just is not so — and the lack is not only serious; it can well be fatal.

It is a matter of the most urgent national importance that the President's recognition of the

need of more and better industrial tools should be followed by effective action. *That calls for changes in the national policies that are now blocking and, unless changed, will increasingly block business from meeting this need. If business cannot get enough new tools, the result will not be higher, but lower standards of living five years from now.*

The President should talk this matter of business investment over with Senator O'Mahoney, the Chairman of the Joint Congressional Committee on the Economic Report. Senator O'Mahoney would take to the discussion knowledge of the investment situation recently acquired through his conduct of a series of Congressional hearings.

If he told the President what he told the press during the course of these hearings, he would say, "the private capitalistic system is being seriously threatened by a lack of venture capital." That is in direct conflict with the President's conclusion that "there are in general sufficient funds available."

This serious shortage of adequate investment in new plant and equipment is brought forth so that all of us can understand it by McGraw-Hill's annual survey of American industry's plans for investment in new plant and equipment in 1950, which has just been completed.

continued on next page

BUSINESS' PLANS FOR 1950

These are the major findings of the McGraw-Hill survey of "Business' Plans for New Plants and Equipment" in 1950. Made by the McGraw-Hill Department of Economics, the survey shows:

1. Industry—as represented by manufacturing, mining, transportation, and utilities—now plans to invest \$12.4 billion in new plants and equipment this year. This is 13% less than was actually spent last year.

2. Manufacturing industries alone plan to spend \$6.3 billion in 1950 for new facilities. This is also 13% less than they spent last year.

3. Manufacturers as a whole expect their 1950 sales volume to about equal 1949's.

4. Manufacturers will expand their capacity about 3% in 1950, under present

plans. The largest part of their funds, 65%, will go to replace and modernize existing facilities.

5. Profits and reserves are expected to provide 92% of the 1950 investment funds of manufacturing companies. These companies count on new common stock issues to provide less than one-half of one per cent of the investment funds they will need.

6. Two out of three manufacturing

A copy of a complete report on "Business' Plans for New Plants and Equipment" may be obtained by writing me at McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 18, N. Y.

companies review their investment plans monthly. Almost all companies go over them at least quarterly. The survey shows that companies changed plans rapidly during 1949 to meet changes in their prospects.

7. Other industries are also reducing their investment plans in 1950 by 13%. This coincidence arises from the fact that utility companies, notably the electric light and power companies, plan to spend only slightly less than in 1949. Railroads, on the other hand, are reducing their capital programs in 1950 by more than 40%.

The results of the survey, which are summarized above, show that American Industry—as represented by manufacturing, mining, transportation and utilities—is planning to spend 13 per cent less for new plant and equipment in 1950 than it did in 1949.

Since the rate of investment in new plant and equipment right now is apparently about 15 per cent below the rate for 1949, the present level of business investment may be relatively steady in 1950. That would relieve the fear, expressed by President Truman in his Economic Report, that "if the downward trend in business investment were to continue, our prospects for full recovery and continued expansion would be seriously endangered."

BUT, at the rate of investment planned by American manufacturing industry for 1950, it would take 40 years to modernize thoroughly our present industrial plant and equipment. That would still leave undone the job of increasing it to meet the needs of an expanding economy of the kind sketched by President Truman in his message.

In attaining even this rate of investment, the McGraw-Hill survey shows American business must rely overwhelmingly on its own profits, which have declined as the country has left the postwar boom behind it. Most American companies cannot sell new common stock except at ruinously low prices. Here is one case where gov-

ernment action is really needed to help business and help to keep a rising American standard of living.

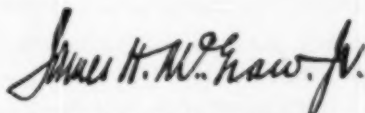
In order to get enough business investment to assure the "full recovery and continued expansion" sought by the President, our country needs:

1. Lower taxes on business income so as to release more money for new plant and equipment.

2. Liberalized depreciation allowances on old plant and tools so that business can buy new equipment faster.

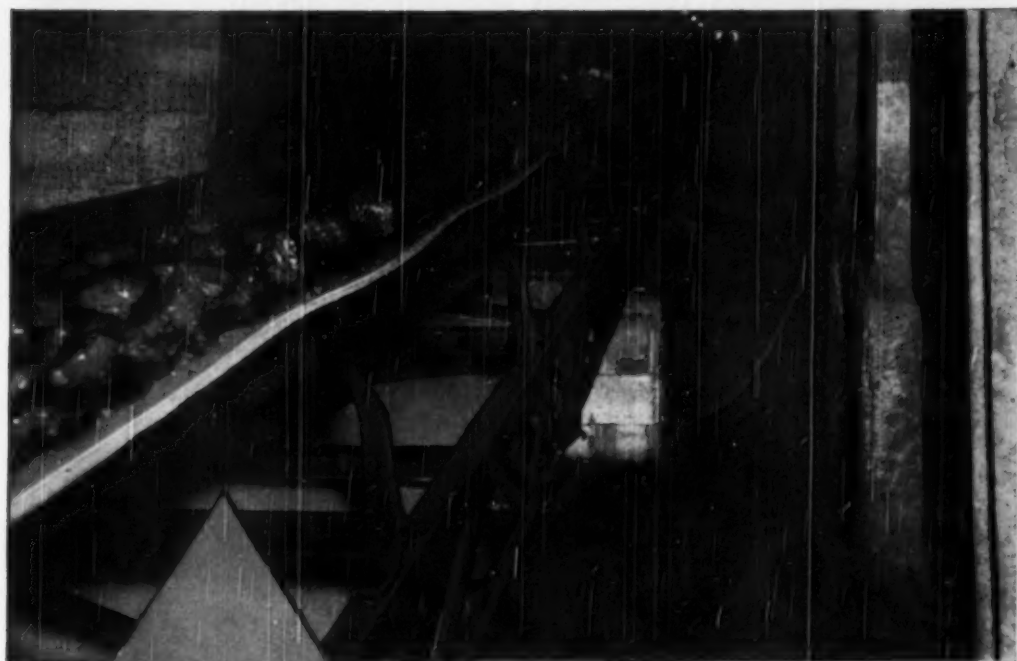
3. Repeal of the present double taxation of dividends which now are taxed once as corporation income and again as personal income.

It is encouraging to have the President explicitly recognize the key importance of adequate business investment in providing steadily expanding prosperity. The next and most important thing to do is to make this recognition effective by discarding national policies which are blighting an adequate volume of business investment.



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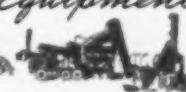
PERMANENT CONVEYORS



PORTABLE CONVEYORS



COAL MACHINES



BITUMINOUS PLANTS



FINISHERS



DITCHERS



CURRENT PROBLEMS facing the industry and research activities were discussed at the opening session by J. L. Hamilton (left photo), vice president, operations, Island Creek Coal Co.; and Dr. Harold J. Rose (right), vice president and director of research, BCR. J. M. Lowe, Hillman Coal & Coke Co., shown with Mr. Hamilton, was re-elected secretary-treasurer of the institute.



SUSPENSION-TYPE ROOF SUPPORT: Edward Thomas (left), U. S. Bureau of Mines; and C. C. Conway (right), chief engineer, Consolidated Coal Co. M. L. Coulter (center), Clearfield Bituminous Coal Corp., newly elected institute president, presided.



CONTINUOUS MINING: R. T. Artz (left), U. S. Bureau of Mines; J. J. Snure, Rochester & Pittsburgh Coal Co.; and C. H. Snyder, Sunnyhill Coal Co. G. A. Shoemaker, president, Pittsburgh Coal Co., and CMIA vice president, was chairman.

CMIA Considers Progress and Problems

Progress in Research, Experience with Continuous Mining Machines, Suspension-Type Roof Support, Coal Economics, Safety and Use of Electric Heating Devices Discussed at 63rd Annual CMIA Meeting in Pittsburgh

OVER 600 MEMBERS and friends of the Coal Mining Institute of America, attending the 63rd annual meeting of the organization in Pittsburgh, Pa., Dec. 15-16, heard warnings of a decreasing coal market for 1950 and had urged upon them the necessity for intensive research into new uses if the industry is to hold its own in the face of strikes and pressing competition.

Institute officers elected for 1950 were: president, M. L. Coulter, Clearfield Bituminous Coal Corp.; vice president, G. A. Shoemaker, Pittsburgh Coal Co.; D. J. Keenan, Pennsylvania Department of Mines, and H. P. Greenwald, U. S. Bureau of Mines; secretary-treasurer, J. M. Lowe, Hillman Coal & Coke Co.

Coal is losing out to oil in the battle

for customers, declared J. L. Hamilton, vice president in charge of operations, Island Creek Coal Co., in his president's address at the opening session Dec. 15. Mr. Hamilton stated that Arabian oil is being placed on the New York docks at 75c per barrel. With 4 bbl of this oil equivalent in heating value to 1 ton of coal, Mr. Hamilton noted that coal freight rates alone exceeded this delivered price for oil. Natural gas, also, was included as offering stiff competition, with a million coal Btu's costing 19c at the mine and a million natural-gas Btu's costing 6c at the well.

Increased combustion efficiency also reacts against the coal market even though steam-powered generating plants have increased in number. To



ELECTRIC HEATING, SAFETY AND ECONOMICS: F. F. Dickmann (left), West Penn Power Co.; J. D. Cooner, The Hudson Coal Co.; and G. A. Lamb, Pittsburgh Coal Co. D. J. Keenan (right), Pennsylvania mine inspector, presided.

illustrate this fact, Mr. Hamilton stated that 1,550 kw were produced from 1 ton of coal in 1946, but 2,400 kw will be expected from 1 ton in 1950. Thus, increased generating facilities will not result in corresponding market increases for coal. These considerations, in addition to strikes and the high cost of labor, concern everyone in the industry, and every man in the industry must work harder to meet these threats.

Mr. Hamilton also discussed the threat to private enterprise embodied in present controlled-economy proposals, and in the philosophy of giving everyone an equal share regardless of his effort or performance. One of the industry's biggest jobs at present is selling America back to Americans, Mr. Hamilton said.

Harold J. Rose, vice president and director of research, Bituminous Coal Research, Inc., presented a review of active and projected research into better utilization and new uses for coal. Dr. Rose pointed out that BCR is supported by funds contributed by 300 coal companies, 14 coal-carrying railroads and several equipment manufacturers. The coal companies contribute 4¢ per ton of coal produced for commercial distribution, and the tonnage so levied represents only 40% of total commercial production. In many projects coal-industry funds have been matched by contributions from other mutually interested industries.

Dr. Rose outlined the technical activities of BCR in three broad classifications: general research, locomotive research and continuous-mining research.

The general investigations include steam-locomotive combustion, smokeless domestic heaters, homes designed for coal heating, residential ash handling, farm-product drying, package boilers, cinder and fly-ash collectors, and improvements in gas producers. Fundamental research is pursued to find new chemicals from coal, improve

gasification processes and solve problems in acid mine drainage, Dr. Rose said.

Locomotive research has resulted in a full-scale coal-fired gas-turbine locomotive drive now undergoing stationary tests. Results so far have been up to expectations, considering the magnitude of the problems encountered. Dr. Rose presented the following as an example of the problems: industrial plants require heat conversion at the rate of 20,000 Btu per hr per cu ft of boiler volume, but an efficient gas-turbine locomotive operates at a rate of 1,000,000 Btu per cu ft per hr.

Investigations in continuous mining are pointed toward development of a unit that can be built on existing machines at reasonable cost and will be applicable in thin seams.

Results of BCR's investigations must be sold to manufacturers in many cases, even after they have been proven sound. This was the case after overfire jets, for injection of additional air above fuel beds, were proven effective on locomotive and stationary boilers. This particular development was promoted by one-day clinics for operating engineers, with BCR personnel conducting the clinics.

Dr. Rose closed with this quotation from an industrial executive: "Research is the most profitable and least hazardous investment the coal industry can make."

The subject of the second session was suspension-type roof support, with papers on the subject by Edward Thomas, mining engineer in charge of the roof-control section of the U. S. Bureau of Mines, College Park, Md., and C. C. Conway, chief engineer, Consolidated Coal Co., St. Louis, Mo.

Mr. Thomas presented a series of slides showing typical roof-bolt installations, supplies required, installation methods and various bolting patterns. The first indication of roof failure is a crack that appears in the open roof. This crack, termed a tension crack by Mr. Thomas, and the characteristic

failure in shear, tend to classify mine roof as a beam, because failure occurs as a result of tension in the bottom fibers as in any overstressed beam carrying a direct load.

A set of 1x12-in boards was used to demonstrate the action of bolts in tying roof strata together to limit deflection. These stacked boards, supported at the ends, were loaded and the deflection measured. They were then bolted together and the deflection under the same load was materially reduced.

Mr. Thomas stated that advance warning of roof failure in a bolted section was given in at least one instance. In this instance, the bolts in an 85-ft length of bolted entry emitted a steady whine or hum before failing. Mr. Thomas stipulated that thoughts on suspension support change from day to day at this stage and advocated the use of safety posts and some conventional timbers in conjunction with the bolts until more experience is gained.

Mr. Conway, who introduced roof bolting to the coal industry at a mine in Illinois, said that most reports on bolt installations have been favorable and cited several advantages in favor of this system of roof support: increased safety because there are no timbers to be knocked out, better product to the washer because contamination by falling roof rock is prevented, reduced wear and tear on equipment previously encountered in loading fallen rock, and better housekeeping and wider clearances because of the absence of posts.

Suspension support has permitted some mines to operate that otherwise have been forced to close because of high timbering costs. Thus it fills an economic need where it is applicable.

A flexible drilling machine on a self-propelled chassis was suggested by Mr. Conway as one way to speed the bolting operation to keep up with other equipment in the present mining cycle. Improved electric drills on this machine would permit the removal of compressed-air equipment from mines using air for drilling bolt holes only. A properly designed machine of this type could also be used to drill face holes, thus serving a double function with a minimum crew.

Mr. Conway's personal theory on roof failure is that the roof first breaks in shear near the rib lines, thus destroying any similarity to a restrained beam. The roof over the opening is then free to act as a simply supported beam, and falls when dead weight or imposed loads result in excessive deflection.

Mr. Conway also discussed the possibility of bolt recovery and re-use under favorable conditions. This has been done successfully where timber and bolts have been used together, and is possible only with expansion shell bolts, which are higher in first cost.

M. H. Forester, vice president, Pitta-

(Continued on page 168)



PARTICIPATING IN THE KENTUCKY INSTITUTE MEETING were: C. H. Hodgson (seated, left), C. B. Burchfield, A. D. Sisk, Lynn R. Buckner (standing, left), Neely C. L'Argent, Arthur Bradbury, W. L. Husk and James Benson.



AT THE BANQUET—Davis Read (left), newly elected institute president; J. E. Johnson Jr., toastmaster; Joseph E. Moody, guest speaker; C. B. Burchfield, retiring president; S. M. Cassidy; and F. M. Medaris.

Kentucky Mining Institute

Mine Air, Roof Bolting, Mining and Electrical Safety, Multiple Blasting, Strip Mining, Land Conservation, Mining Education and German Methods Among Varied Subjects Discussed at Lexington Meeting

LOW-COST roof-bolting drill stands made from automobile hydraulic bumper jacks and a simple "miniature-mine" dust-sampling apparatus were among the exhibits accompanying papers on roof bolting and safety at the meeting of the Kentucky Coal Mining Institute, Phoenix Hotel, Lexington, Ky., Dec. 9-10. Multiple blasting, delay detonators, strip mining, land conservation, electrical safety, a description of German coal mining and a report of 1949 Kentucky explosions and fires rounded out the program.

Joseph E. Moody, president, Southern Coal Producers' Association, spoke at the banquet Saturday evening, with J. E. Johnson Jr., president, Kentucky Blue Grass Mining Co., as toastmaster. Davis Read, chief engineer in charge of production, West Kentucky Coal Co., was elected president of the institute. Vice presidents are: J. B. Marcum, general manager, Blue Bird Mining Co.; Hazard; F. P. Kerr, general manager, Eastern Coal Corp.; Stone; and L. P. Johnson, vice president and general manager, Crummies Creek Coal Co., Crummies. A. D. Sisk, chief, Kentucky Department of Mines and Minerals, was re-elected secretary-treasurer. C. B. Burchfield, general manager, Black Star Coal Corp., and retiring institute president, presided

at the technical sessions and was assisted by C. H. Hodgson, district manager, Mine Safety Appliances Co., and chairman of the program committee, and H. M. Gallaher, superintendent, Harvey Coal Corp. Vice chairman of the program committee was R. L. Smith, Mine Safety Appliances Co., Harlan.

Crawford L. Wilson, safety engineer for the West Virginia and Kentucky mines of the Berwind-White organization exhibited the "miniature-mine" dust-sampling apparatus in connection with a paper on "Atmospheric Pollution and Dust Sampling In and About Coal Mines." This sampler, in regular use in mines with which he is associated consists of a 2-cu ft portable box containing removable baffles around which air is pulled by an electric vacuum cleaner attached to the outlet of the box. Collection of dust in the box, on the baffles and in the cleaner bag, after operation for a measured length of time, indicates the quantity of dust present.

Photographs also were displayed that showed mine locomotives of the outside-wheel type equipped with fenders installed over the wheels to reduce by about 40% the track dust to which the motorman is exposed. It also was suggested that trip size

be regulated to avoid excessive use of sand.

Mr. Wilson recommended wet drilling for rock work, but pointed out that several dry dust-collecting systems are available. The dust hazard in coal mining can be minimized by circulation of enough air through working places to dilute dust that has remained in suspension despite other means of control, he said. High air velocity in rooms and entries, however, tends to keep dust stirred up. On the concluding part of his paper, which covered practically all phases of the dust problem, he remarked that a new profession is taking shape: namely, "industrial health engineering." As to the future, Mr. Wilson declared that "There is no coal-mine health problem that cannot succeed when the mine workers, the state department of mines, the federal bureau of mines, coal mine owners and all work together."

For the natural conditions of slate top with occasional sandy streaks in the mines of the Consolidation Coal Co. (Ky.), Jack Berry, production engineer, said that the expansion-shell roof bolt is preferred because of the ease of setting and because air equipment is not necessary, since this top can be drilled with rotary equipment using 1½-in tungsten-carbide bits. The paper, which was illustrated with slides, covered experience with other-type bolts, including the slot-and-wedge unit.

Two men drilling and installing about 100 to 120 bolts per shift keep up the roof bolting for a mechanical unit. Three men were required for a crew using the slot-and-wedge type.



ALSO ACTIVE ON THE TWO DAY PROGRAM of the Kentucky Coal Mining Institute were: J. K. Berry (seated, left), C. L. Wilson, L. G. Fitzgerald, Edward Thomas, A. D. Sisk (standing, left), Virgil D. Picklesimer, Andrew D. Easton, Frank J. Forsyth, C. S. Carter and Harry Fisher.

Material cost, using 42-in bolts with expansion shells, is about 75% of that with crossbars and posts.

Timbering machines have been temporarily adapted to the bolting job with attachments at the end of the boom to hold the rotary electric drill and electric impact wrench, Mr. Berry said. Recently a special Jeffrey machine, 36 in high, has been received at one of the mines. On this machine a hydraulic motor operates the drill and the unit feeds straight up instead of slightly tipping as with the unit on the timbering machine.

During the discussion, Fred Stewart, superintendent of the new mine of the Jewell Ridge Coal Corp., in the Hazard field, said that about 10,000 slot-and-wedge bolts have been installed in that mine to hold a 24-in drawplate capped with 4 in of roster coal. Bolts are on 4x5 ft centers and suspend the roof rather than making a beam of it. The only failures have resulted from drilling holes too deep, in which cases the wedge did not cause full expansion of the rod. R. G. Laxzell, Island Creek Coal Co., reported that his company is using 5,000 to 6,000 bolts per day and that the few failures have resulted from the lack of experience of the men installing the bolts. For drilling hard-rock top, central compressor stations are being installed.

Edward Thomas, chief, roof bolting section, U. S. Bureau of Mines, in speaking of the dust hazard from roof-bolt drilling, said that rotary drilling makes less dust than percussion drilling unless water is used on the latter. Respirators can protect the drillers, but don't protect those working on the return air, he stated.

Anchoring bolts in a rider seam in a No. 11 seam mine of the West Kentucky Coal Co. was described by Mr. Kelly, of that company. The top is

18 in of drawplate and between it and the rider coal is a limestone stratum ranging from several inches down to a fraction of an inch. Wet stopers are used for all of this roof bolting. The hesitation of many operators to go to wet drilling is mostly a "mental hazard," Mr. Kelley believes. When properly trained with water drilling, the men do not object to it.

C. F. Rivera, general superintendent, Tennessee Products & Chemical Corp., Whitwell, Tenn., reported that roof bolting in rooms worked with power duckbills in 39-in coal has increased the production from two falls per shift to about 2½. For this low-coal work, he exhibited a drill stand made by welding a bracket to an automobile hydraulic bumper jack. A Chicago Pneumatic No. 571 electric drill is used for both the drilling and tightening of the ¾-in by 2-ft bolts, which are anchored by Elreco expansion shells. Some 2,000 ft of heading has been bolted, using three bolts in line across, with the lines spaced every 4 ft. This method saves brushing, which was carried to about 100 in.

No permits are required in Kentucky for starting roof bolting, Mr. Sisk pointed out. He wants operators to experiment but asks them to be cautious. The state inspectors will act if they find that a hazard has been introduced. Earl Maize, safety engineer, National Coal Association, urged operators to give serious consideration to wet drilling.

James Benson, U. S. Bureau of Mines, Birmingham, Ala., reading parts of a prepared paper, described German coal mines as he observed them while in Germany for about a year as one of three safety men with the coal-control group. Steeply pitching seams, deep shafts (some over 4,000 ft), high-ash coals and longwall mining with percussion picks are com-

mon. The accident record was very high in 1947. In that year, among one group of 5,258 men working underground and above, there were 3,434 accidents and 13 fatalities.

In discussion, Max Forester, vice president, Pittsburgh - Consolidation Coal Co., who also spent some time in German mining, said that nothing there is wasted... and every pound of coal is recovered. In contrast to underground work, strip mining of brown coal is highly mechanized. At one operation eight men, operating heavy machinery, mine 12,000 tpd.

"Creating Interest in Safety Among Mine Workers," was the subject of a paper by Arthur Bradbury, safety director, Inland Steel Co., Wheelwright. Mine safety will improve in direct ratio to the interest workmen themselves take, Mr. Bradbury said. Progress is retarded in some cases by management not realizing the importance of safety and by men obstructing the use of safety equipment. Discharge of a few men for serious infractions of safety rules, with union officials sustaining such discharges, could be of great benefit to the safety movement, he maintained.

Experience since 1944 in teaching mining by the Vocation School at Madisonville, in western Kentucky, was outlined by Lynn R. Hucker, instructor. This work has been confined to preparing men for certificates and the course takes 72 hr. Day and night classes are held throughout the field, with class enrollment averaging about 16.

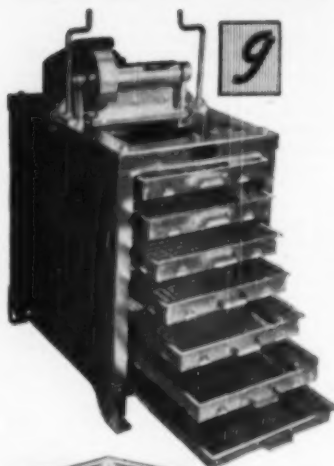
Responding to a request by the chairman, A. P. Prater, superintendent of public schools, Earlington, Ky., described the "Elements of Mining" course which he has instituted in the Earlington High School. He took this step last year, after noting that 70% of the boys who 10 years ago said they were not interested in mining now are working in the local mines. A series of monographs are used in this course, so that sheets not up to date can be replaced at any time. The studies in the first year include a brief history of coal, uses, formation, seams in Kentucky, quality, mine gases, ventilation and mine mathematics. The second- and third-year studies will be more advanced. Chief engineers, chemical engineers and other mining-company officials review and approve the material in the monographs.

"Strip Mining and Conservation," by Neely C. L'Argent, strip mine superintendent for the Consolidation Coal Co. (Ky.), described the mountainside stripping of that company. The hills are so steep that only about 40 to 50 ft of good coal is recovered in stripping to a 50-ft highwall. It is difficult to shoot overburden rock so that it will not be too blocky for handling with the Lima Type 1201 high-front shovel.

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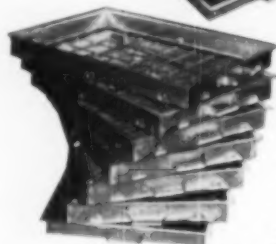


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MEETINGS

- Bituminous Coal Research, Inc.: annual meeting, Feb. 9, Netherland Plaza Hotel, Cincinnati, Ohio.
- AIME: annual meeting, Feb. 12-16, Hotel Statler, New York City.
- Southern Coal Producers' Association: annual meeting, Feb. 13, Washington, D. C.
- Stoker Manufacturers' Association: Winter Membership Conference, Feb. 16 (tentatively), La Salle Hotel, Chicago.
- Midwest Power Conference: 12th annual conference, sponsored by the Illinois Institute of Technology with the cooperation of 18 midwestern universities and professional societies, April 5-7, Hotel Sherman, Chicago.
- American Mining Congress: Coal Convention, April 24-26, Netherland Plaza Hotel, Cincinnati, Ohio.

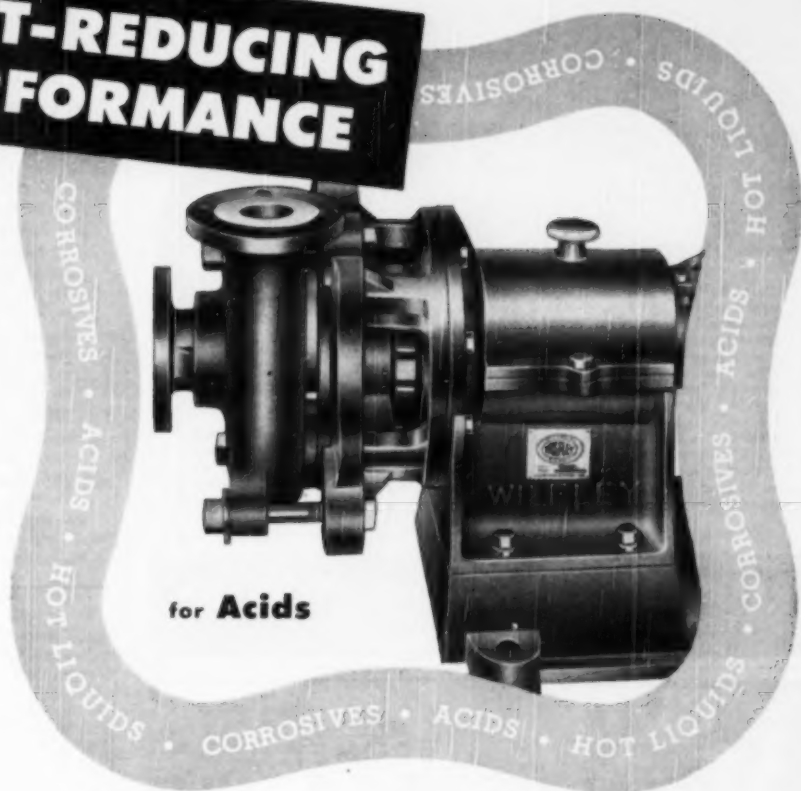
this stripping. Good roads for all-weather operation are built and hauling is done with International KB11 trucks carrying 15 tons. It has been noted that strip pits along the hillsides retard the danger of flash floods and minimize erosion, Mr. L'Argent reported. This territory never was farm land so that there is no need for leveling, which would pack the material and retard the natural seeding with native trees.

In western Kentucky, conservation following strip mining got under way in 1948 with the planting of 100,000 trees and the seeding of 100 acres, according to a paper, "Strip Mining and Land Use Conservation," by James H. Moore, director, Kentucky Reclamation Association, and read by W. L. Husk, chief engineer, Luzerne-Graham Mining Co. Real progress was chalked up in 1949, with 507 more acres seeded and 400,000 trees planted. More planting would have been done but for a shortage of nursery stock.

One hundred acres of land stripped in 1923 and left for nature to take its course now is so covered with timber that it is hardly distinguishable as stripped land. Up to the beginning of World War II, 900 acres in western Kentucky had been stripped. In 1947, a U. S. Forestry Service survey showed that 5,600 acres had been stripped. The year 1948 added 1,114 acres and it is estimated that 1949 will add 800 acres. The total of 7,500 acres constitutes only about 0.44% of the total area of the six counties in which stripping has been carried on and, for the most part, these were originally non-productive lands.

The reclamation association was chartered March 1, 1948, with 23 operators as stockholders. Its objective is to attain the best possible reclamation without legal interference or red tape. Besides the planting and seeding already mentioned, lakes are

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EQUIPMENT APPROVALS

Seven approvals of permissible equipment were issued by the U. S. Bureau of Mines in December, as follows:

Ensign Electric & Mfg. Co.—Distribution box; one to four circuits, 550 v. dc; Approval 2-676A; Dec. 13.

Hendrie & Bolthoff Co.—Fan drive unit; one motor, 3 hp, 500 or 550 v. dc; Approval 2-706A; Dec. 16.

Joy Mfg. Co.—Type U-179-56PKK chain conveyor; one motor, 20 hp, 550 v. ac; Approval 2-707A; Dec. 16.

Jeffrey Mfg. Co.—Class 64 distribution box; three branch circuits, 250 v. dc; Approval 2-708; Dec. 20.

Thomas A. Edison, Inc.—Type R-4 single-shot blasting unit [for use with Edison R-4 cap lamp]; Approval 1229; Dec. 27.

Jeffrey Mfg. Co.—Type 61CLR loader; one motor, 20 hp, 220 and 440 v. ac; Approvals 2-709 and 2-709A; Dec. 29.

Joy Mfg. Co.—Type PL12-2APN elevating conveyor; one motor, 7 1/2 hp, 500 v. ac; Approval 2-710A; Dec. 30.

being stocked with fish and the land with quail and pheasants. It has been determined that leveling would spread acids, stop the leaching of acids from the top soil, reduce absorption of water and, by packing action, cause years of retardation in growth of trees.

Multiple blasting by connecting some number of shots in series, usually less than 10, is proving a safe practice, according to a paper by Lloyd G. Fitzgerald, mining-explosives engineer, U. S. Bureau of Mines, Mt. Hope, W. Va. A report on this paper, as presented initially at a meeting of the West Virginia Coal Mining Institute, appeared in *Coal Age*, July, 1948.

Harry Fisher, Norton, Va., a representative of the American Cyanamid Co., commenting on this subject and emphasizing the use of delay detonators, pointed out that multiple blasting up to seven shots does not add much concussion, makes little or no more dust, uses less explosive, gives the forces a more even distribution, results in fewer unburdened shots, has improved mining efficiency and, in general, has eliminated many shooting hazards. In one mine, however, the percentage of blocky lump is not as good as it was with single shooting. Split-second delay detonators now are available for multiple blasting. In a coal mine in Washington, shooting off the solid, their use results in less dust and improved coal. Mr. Fisher cited other instances where multiple shooting, with either regular or split-second delay detonators, proved better than single shooting.

F. J. Forsyth, district electrical in-

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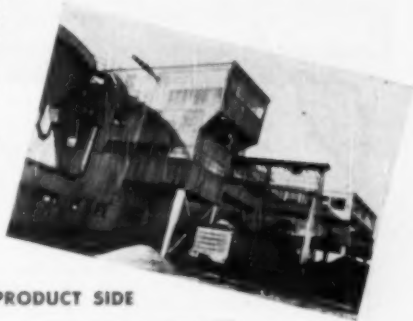
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spector, Kentucky Department of Mines, Pikeville, outlined various electrical recommendations as a preliminary to the formation of a code. These included, in substance, the following:

Outside—(1) keep high-voltage lines at least 15 ft above the ground; 20 ft where there may be traffic; (2) erect barriers between high-voltage lines and telephone lines; (3) install insulators in guy wires so that a man working on the pole circuit cannot touch the grounded portion of the guy wire; (4) where a fourth (grounded) wire is carried, make sure that it is installed so that it will not break; (5) put low-voltage wires on insulators unless the wire is manufactured for contact with building materials; (6) install lightning arresters in all ac and dc circuits; (7) ground transformer tanks when less than 15 ft from the ground; (8) keep switch boxes free of dust.

Underground—(1) spread out any extra length of live cable on the mine floor out of the way of injury (as an alternative, hang it up, but, a fire would be harder to put out); (2) remove a trailing cable for permanent repairs if it has over five temporary splices; (3) cutting-machine cables should not be single-conductor; (4) transformers supplying 440 v should be Y-Y, with a ground wire used; (5) ground the frames of hand-held tools; (6) fuse the power wires of hand-held tools; (7) ground all pump frames; (8) connect water pipes to the ground wires; (9) crossbond tracks every 200 ft; (10) hold voltage drop in working sections to less than 25%; (11) provide approximately the same carrying capacity in the positive and negative sides of dc circuits; (12) cross-connect trolley and feeder at close intervals; (13) place high-voltage feeders on airways and preferably bury them; (14) install transformers so that oil is confined if it leaks; (15) place extinguishers in substations and at each stationary motor; (16) replace grounded trolley hangers; (17) have electrical workmen wear insulating gloves and shoes; (18) fuse all motors; (19) keep electrical circuits away from conveyor belts; and (20) protect all telephones with lightning arresters.

In a report to the institute, on 1949 developments in Kentucky, Mr. Sisk said that to date 12 explosions and fires had occurred with a loss of three lives. One fire consumed 80 ft of conveyor belt. Two men using carbide lights were badly burned when they cut into an abandoned oil well. Six of the fires were caused by electricity and four of the explosions were traced to the improper handling or use of mine explosives.

Mining-engineering students at the University of Kentucky number about 85, not counting freshmen who may later decide on that course, said C. S. Carter, professor of mining engineering. He invited coal operators to make suggestions if they feel that the university is not handling mining education in the manner they would prefer.



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Workmen's compensation is a fine thing—but it can't replace a mangled arm.

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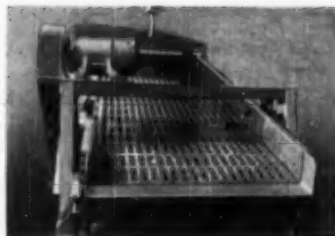
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Prof. Carter reviewed the history of coal in Kentucky, beginning with its first mention in 1750, its first commercial use in 1790 and a record of 330 tons in 1828. The first engineering degree was granted by the university in 1890.

Bill Bassett, Madisonville, Ky., one of a number of mining-engineering students attending the meeting, asked the institute to permit affiliation of a student section.

Recommendations of the institute's subcommittee on the mining-engineering curriculum of the university were summed up as follows: teach approximately double the present number of hours of English; increase the requirements in electricity and reduce electives; substitute a mechanical course for the present course in thermodynamics; and require some work in a mine in addition to the summer surveying camp. The subcommittee was composed of S. M. Cassidy, president, Consolidation Coal Co. (Ky.), as chairman, F. M. Medaris, Mr. Kerr, C. W. Denham and L. W. Huber (deceased). The report was read by Lee D. Siniff, electrical and mechanical engineer, Consolidation Coal Co. (Ky.).

Following a report by V. D. Picklesimer, general superintendent, South-East Coal Co., Seco, chairman of a subcommittee on mining-extension education, the institute passed a resolution asking the trustees of the university to set up mining field classes.

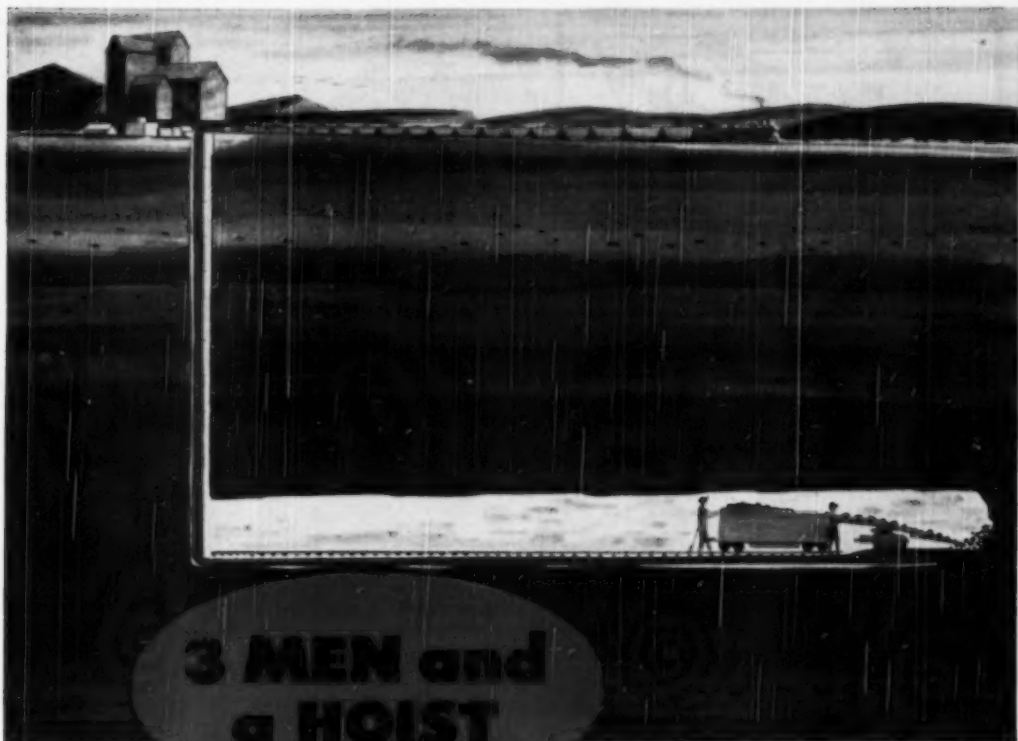
Coal Mining Institute

(Continued from page 159)

burgh Consolidation Coal Co., in his discussion of the papers, stated that his company has a shuttle-car section in operation that could not be worked profitably with other roof-support systems. Use of roof bolts permitted widening the openings from the original 18 ft to 36 ft, with a consequent 60% increase in production from the section. Dust suppression during drilling should be investigated with the goal of removing this important consideration from employee responsibility, Mr. Forester said. He also described an experimental installation of preservative-treated wooden pins supporting 2,000 ft of 12-ft-wide entry at a mine operated by another company. Further experiments with this type of support are being conducted.

Emphasizing research as a major factor in the future stability of the coal industry, Charles E. Lawall, assistant vice president, Chesapeake & Ohio Ry. Co., Huntington, W. Va., pointed out the necessity for sound planning during healthy periods in the industry's history to offset ills that affect coal's well-being at other times. Mr. Lawall, the principal speaker at the institute's annual banquet Thursday evening, was introduced by Toastmaster W. L. Affelder, executive vice president, Hillman Coal & Coke Co.

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tion of science and technology to the coal-mining industry was outlined by Mr. Lawall, who offered this review of progress as an indication of future benefits to be derived from research. He stated that coal will continue to carry a major portion of the energy load of the nation, but cited the fact that a new producing oil well is brought in every 23 min as an indicator of the competitive situation. Coal comprises one-third of all freight shipped in this country and so makes a major contribution to the economic welfare of the nation. Stating that the coal industry has as much to offer as any other career, Mr. Lawall praised management's recruitment of young technical men to the industry.

The Dec. 16 morning session was devoted to continuous mining, with papers presented by C. H. Snyder, president, Sunnyhill Coal Co., Pittsburgh; J. J. Snure, production manager, Rochester & Pittsburgh Coal Co., Indiana, Pa.; and R. T. Artz, mining engineer, U. S. Bureau of Mines, Pittsburgh. Mr. Shoemaker conducted the meeting.

Operating principles and improvement of early models of the Colmol were presented by Mr. Snyder. The cutting heads on the Colmol are arranged in three tiers, each tier set back from the one below. The bottom row, therefore, attacks the face first by drilling five 2-in. holes. The next higher row of heads mills the coal toward the relief provided by these holes. Each row of heads works toward the free face provided by the lower preceding heads. In addition, each cutting head rotates within part of the circle of influence of adjacent heads, thus providing relief in the maximum number of directions. The action is a chipping and breaking process, with cleats and cleavage planes in the coal providing break surfaces.

Power demands are relatively uniform because the first penetration of the face involves only 15% sq in of area in the five holes drilled by the bottom row of heads. These bottom heads lead the next higher row by a 1-in. advance into the coal.

One of the problems encountered in early models of the Colmol was its tendency to climb as it worked against the face. It was found that this was the result of a shift of the center of weight toward the rear when the cutting head started to work in coal. The defect was remedied by shifting the center of weight well forward of the center line of the tracks, and later models do not exhibit this climbing tendency. Four hydraulic jacks were added to assist in leveling the machine near rolls or faults in the bottom, and difficulties with lubricating circuits were corrected.

Mr. Snyder asserted that the full effectiveness of continuous mining machines will not be realized until transportation systems are designed that will successfully handle the production of these machines. For example, a Colmol produced 261 tons



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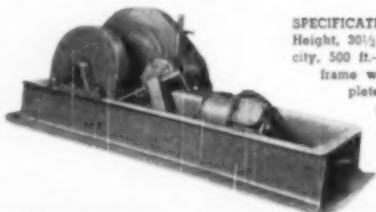


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from a 49-in seam with an actual cutting time of only 1 hr 50 min in an 8-hr shift. The machine itself caused none of the delays.

Mr. Snure presented facts from Rochester & Pittsburgh's experience with 11 continuous mining machines now in use at the company's mines in Pennsylvania and West Virginia.

Continuous mining as an established recovery method must come earlier than the 7- to 10-year limit previously estimated for the economic self-preservation of the industry, Mr. Snure declared. Present demands for higher wages and welfare payments will result in a direct increase of 35c per ton. This increase cannot be passed along to the consumer because of the existing competitive situation. New systems of mining designed to take advantage of continuous methods must be developed and equipment development must keep pace.

Mr. Snure said that present continuous mining machines are well engineered and require no changes in fundamental design. Suggested changes in the machine have been made by Joy after consultations with operating officials. These include addition of screw-type collectors to gather spillage on the bottom and move it to the conveyor, repositioning of hydraulic lines to reduce stoppages resulting from shock loads, redesigning of spray systems to further reduce dust at the face, and changes in the power-transmission system to prevent backdrift as the machine sumps into the face. Such changes are made as extensive experience points to their need.

Several different crew combinations have been tried. Rochester & Pittsburgh now uses five-man crews consisting of operator, mechanic, shuttle-car operator, surge-car attendant and boom attendant at the belt. All men timber when not otherwise engaged because the machine is stopped to permit timbers to be erected.

In a Pennsylvania seam 42 to 48 in thick, an actual production of 25 tons per man per day is realized against a theoretical output of 53 tons if the coal could be moved from the machine efficiently. In West Virginia, 36 to 40 tons per man per day is produced from a 56-in seam. In both instances, a 50% increase is possible with better transportation. The attainment of maximum theoretical production raises the question of whether one man would be able to operate any continuous mining machine for a full shift without undue fatigue, Mr. Snure stated.

Although ventilation and safety problems encountered in continuous mining are similar to those met in mining by other methods, corrective measures must be applied more promptly because of the rapid rate of advance, Mr. Artz said in presenting the final paper at this session (November, 1949, *Coal Age*).

F. F. Dickmann, senior industrial engineer, West Penn Power Co., Pittsburgh; G. A. Lamb, manager of busi-

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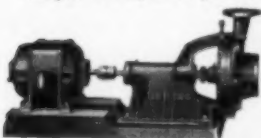
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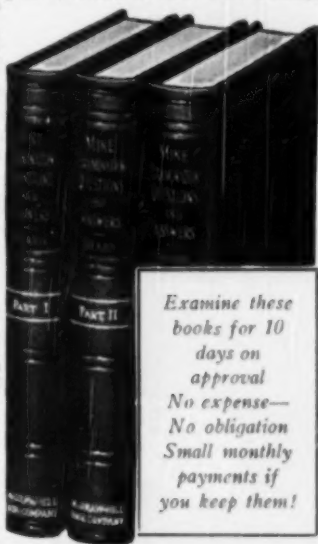
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ness surveys, Pittsburgh Consolidation Coal Co., Pittsburgh; and J. D. Cooner, safety engineer, The Hudson Coal Co., Scranton, Pa., presented papers on operating, economic and safety aspects of the industry at the final session Dec. 16. D. J. Keenan, Pennsylvania state mine inspector, Barnesboro, Pa. presided.

Describing electric heating devices for the coal-mining industry, Mr. Dickmann cited four qualities that make this application of electric heat attractive. They are: (1) low first cost, (2) safe operation where an open flame is too dangerous, (3) automatic operation and (4) convenience.

A very useful device is heating cable. Mr. Dickmann said. It consists of No. 19 nichrome wire insulated with varnished cambric and covered with a lead sheath. The cable can be applied to water piping to prevent freezing and can be thermostatically controlled to provide trouble-free dependable operation. This cable has been used as a foot warmer at one operation. It was placed under an inch of concrete at a place where a slate picker stands to perform his duties. A sheet of asbestos $\frac{1}{2}$ in thick under the cable prevents the heat from dissipating downward. The device costs $\frac{1}{2}$ ¢ an hour to operate and keeps the worker comfortable.

Snow-melting devices for highways and railroad switches, radiant heaters for space heating and baking insulating varnishes, and infra-red lamp installations for insulation baking could be used effectively around mine properties.

Electric sand-drying is a reality at a mine operated by Allegheny-Pittsburgh Coal Co. A Syntro vibrator feeds the sand to a sloping trough which passes under 10 Weigand infra-red units. On a test run, this dryer reduced moisture from 5.5% to 0.04% in 330 lb of sand per hour.

Permissible steam cleaners for use inside the mine have been developed. Power consumption by these machines has been reasonable. They are portable and compact and may be used to advantage in keeping heavy equipment clean as a maintenance practice.

Other applications of electric heat to mining needs are: heating wash-house water during the summer season when steam is shut off, heating sludge-settling tanks to prevent freezing, strip heaters on outdoor coal-chute gates, and pumproom heating.

In discussing the cost of electric heating, Mr. Dickmann explained that every Btu in a kilowatt-hour can be converted to usable heat and efficiently deposited in the material to be heated, thus counterbalancing to some extent the higher cost of electrical Btu's.

Noting the 60,000,000-ton reduction in coal's market in 1949 and an even greater loss in production, Mr. Lamb said that the adjustment of the industry to changing fuel-market conditions seems to have taken place in the short space of one year. In presenting the consensus of coal economists, he stated

that the industry will probably experience a more stable year in 1950 but at a lower level of consumption. This would be in line with the 5% general drop predicted for all business. Warm weather, strikes, a 16,000,000-ton drop in exports, increasing combustion efficiency in public-utility plants, and dieselization of railroads were factors in this market reduction that exceeded early estimates by 20,000,000 tons. Also, dumping of residual oils on the market forced the price of oil down as much as 50%, and this condition adversely affected the coal market. Mr. Lamb stated that although the position of coal is basic as a source of energy, it must compete with other fuels on a month-by-month basis if the industry is to stay healthy.

Mr. Lamb estimated a 450,000,000-ton export and domestic market in 1950, with production also near this figure because of present depleted stocks. He further stated that the competitive position of coal is not good, but this is due in part to changes in the fuel picture that are not justified economically. He said that when foreign and domestic oil activities return to an economic basis, many of the coal industry's ills will clear.

The first requisite for a safety program is that management must be "sold" on the need and value, declared Mr. Cooner in his presentation of his company's safety program. Mr. Cooner outlined some of the difficulties encountered in anthracite mining that create unusual hazards. Multiple beds, steep pitches, caved and crushed areas being mined for the third time, blasting off the solid and extensive development openings in rock, with accompanying silicosis hazards, are common conditions in anthracite mining, Mr. Cooner explained.

The safety engineer, two safety inspectors, a ventilation inspector, a dust engineer, and a dust-laboratory technician make up the Hudson Coal safety-department staff. The total salary of this staff represents 0.8c per ton on an annual production of approximately 5,000,000 tons, he said.

Members of the safety department have extensive practical experience and are chosen from the ranks of production supervisors. A position in the safety department should be regarded as a stepping stone to a better job so that top performance will be insured in promoting safety work. Such men are as physically and mentally qualified to handle their jobs as any other supervisor who must deal with problems and people. Willingness to set a good safety example, punctuality, ability to commend or tactfully criticize when necessary, and absolute fairness are characteristics of a good safety official. A natural or cultivated ability to speak and write clearly is necessary to help a safety official present his ideas to others. The willingness to speak in public on safety subjects at every opportunity is also essential, Mr. Cooner stated.

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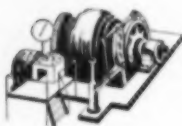
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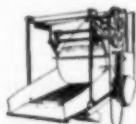
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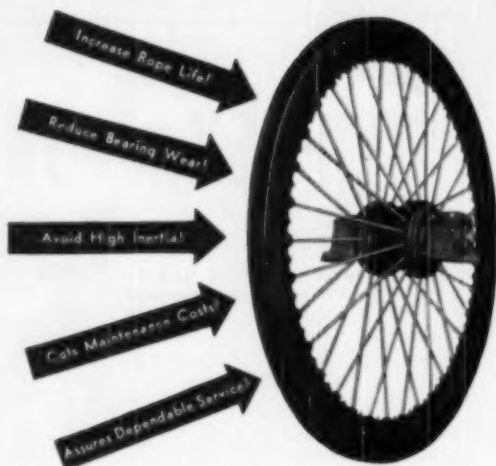
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officials are welcomed because the opinions of others regarding safety work are always beneficial. Accident statistics are analyzed and made available to company officials in periodic reports for their information and use. Safety information is kept before the workmen and officials by all available means. The training of first-aid and mine-rescue teams is a continuing feature of the program, and a permanent mine-rescue organization and procedure have been established. Incentives used to promote safety are constantly watched for signs of staleness or ineffectiveness so that they may be rescinded or replaced if they do not accomplish their purpose.

Safety officials are not saddled with other duties that would limit their time for safety promotion, and the safety engineer reports directly to the operating head of the company.

Mr. Cooner commended M. J. Kosik, president, District 1, UMW, for his safety-promotion efforts among union members. Accident-prevention courses conducted at some collieries were well attended as a result of union and company cooperation. A properly planned and executed safety program will pay for itself by preventing human suffering and saving money for the employer in medical care, compensation and production, Mr. Cooner declared.

West Virginia Mines Set New Safety Record

West Virginia coal mines in 1949 marked up the best safety record in their history, Arch J. Alexander, chief, Department of Mines, reported Dec. 29. About 800,000 tons was produced for each fatality—a gain of some 30% over the 1948 record. The best previous year was 1947, when the rate was one death for every 683,676 tons.

A sharp increase in fatalities in November, when the miners ended a 52-day strike, prevented an even better showing, Mr. Alexander stated. Up to November, output per fatality was close to 1,000,000 tons but 22 deaths in November cut the average down sharply. The department received reports of 152 deaths in mine accidents in 1949 against 277 in 1948.

Coal production in West Virginia in 1949 is estimated at 120,000,000 tons, compared with 168,589,033 in 1948.

Bureau Breaks In First Coal-to-Oil Plant

"Substantial quantities" of oil have been made from tar oil and coal by adding hydrogen, Secretary of the Interior Chapman reported Dec. 24. The oil was produced in a seven-week "break-in" run at the Bureau of Mines hydrogenation demonstration plant at Louisiana, Mo. Output at the

plant totaled as much as 276 bbl per day of gasoline and other fuels. Design capacity is 300 bbl daily.

"This complex new plant completed its first run without serious interruptions, though the operators had only the limited high-pressure experience obtained during a vapor-phase operation last April," Secretary Chapman pointed out. "The extensive use of automatic controls typical in American industrial practice resulted in a comparatively smaller operating force than was customary in the synthetic-fuels plants of Germany," he said. Operating pressures are in the neighborhood of 10,000 psi.

W. Va. Bureau Reports Expanded Safety Program

Plans for expansion of the safety work of the W. Va. Department of Mines were announced Jan. 11 by Arch J. Alexander, chief of the department, who declared that "we are vitally interested in the welfare of all coal miners in West Virginia and are launching an expanded safety program to protect their lives.

"For the first time in the history of the state, we have an experienced safety commission studying reports of all mining accidents of the past four years and making plans to prevent accidents in the future," Mr. Alexander said. The three men comprising the commission have a mining experience totaling more than 150 years, he reported. Their findings and suggestions will be made available to every miner in West Virginia.

In addition, the five new mine-rescue trucks to be delivered to the bureau this spring will be utilized to promote safety education in various mining communities when not in use for rescue work.

Anthracite Research Lab Completed by Government

Completion of the new \$450,000 federal Anthracite Research Laboratory, Schuylkill Haven, Pa., was announced last month. Under construction since the spring of 1948, the new facilities are to be operated under the auspices of the U. S. Bureau of Mines. An appropriation of \$300,000 to provide for the enlargement of the laboratory with the addition of a chemical laboratory fully equipped for research has been included in President Truman's budget for the year beginning July 1 but is still subject to the approval of Congress.

The new federal laboratory will be staffed by some 35 technical, clerical and other employees, with annual governmental appropriation of \$175,000. Work there will be devoted mainly to basic research, on such subjects as: investigation of methods of improved and lower-cost mining (mechanical

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WILLSON answers the problem of getting safety equipment worn by designing the utmost comfort into their entire line of eye and respiratory protective devices. The goggles illustrated have eyecups that are molded to fit the bony structure around the eyes. The chain bridge and elastic headband are adjustable for comfortable fit. And the Super-Tough® lenses meet or exceed Federal Specifications for optical clarity as well as impact resistance.



NEW CATALOG

In addition to product information, it contains information on safety glass, filter glass, respiratory hazards, etc., which will help you select proper safety equipment to meet specific hazards. Send for it!

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DISPOSAL**
of silt,
coal refuse!



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Saves you the high cost

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In coal washeries and processing plants, Morris Pumps have been saving coal operators thousands of dollars in waste disposal operations. They eliminate expensive truck maintenance . . . trucking labor . . . and in many cases, they eliminate the building of roads for trucks to travel.

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MORRIS Centrifugal Pumps

and otherwise); recovery and preparation methods; utilization of anthracite for new uses; gasification of anthracite; and extracting chemical and other by-products. It will not duplicate or conflict with that of the Anthracite Institute Laboratory at Wilkes-Barre.

Fuel Policy Study Proposed for Congress

A resolution calling for the formation of a 14-man Joint Committee on Fuel Policy was introduced into the House last month by Rep. Ivor D. Fenton (R., Pa.). Purpose of the committee would be to study and report on the available fuel reserves of the United States and the present and future rates of consumption and to recommend a national fuel policy adequate to meet the country's needs in both peace and war. The resolution also directs the committee to "study methods of encouraging needed developments to assure the availability of fuels adequate for an expanding economy and the security of the United States."

In introducing the measure, Rep. Fenton pointed to what he believes is the wasteful use of oil and natural gas and maintained that an investigation would reveal that the country will soon face a shortage of domestic petroleum production. Development of synthetic fuels, except from natural gas, cannot be relied on for many years, and then only at the cost of billions of dollars, he continued.

Union Official Blasts W. Va. Safety Chief

C. E. Jones, safety director, UMWA District 29, Beckley, W. Va., and mine-safety committees from 66 local unions in the Winding Gulf field have protested Governor Patterson's reappointment of Arch J. Alexander as chief, Department of Mines. The union's action was taken at a meeting Jan. 8. Approximately 10,000 miners in the area were asked to send letters or telegrams to the governor voicing their objections.

Last spring Mr. Jones demanded the ousting of Mr. Alexander following a series of disagreements over mine-safety legislation and other matters. Mr. Alexander, however, completed his term and was reappointed for a four-year period in December.

A letter to the governor from Roy J. Harris, union safety-council secretary, following the meeting in Beckley described the reappointment as "a stab in the back to all coal miners in West Virginia" and a statement by Mr. Jones added, "Governor Patterson apparently had little regard for the life of the coal miner."

Blue Diamond Coal Co. Names Scholarship Winners

Winners of four new scholarships awarded by Blue Diamond Coal Co., Knoxville, Tenn., recently were announced by Alexander Bonnyman, president, and C. S. Carter, University of Kentucky Engineering Department, which will administer the awards. Scholarships were awarded to Ray Melton, Leatherwood, Ky.; Paul Standafer, Blue Diamond, Ky.; Herbert Dugger, Chevrolet, Ky.; and Charles Gibson, Leona, Ky. The scholarships, valued at \$740 per year for Kentucky residents and \$840 for out-of-state students, will be awarded annually on a competitive basis to employees or sons of employees of the company.

Pennsylvania Company Reports Safety Progress

The Dutch Run mine of Clearfield Bituminous Coal Corp., Indiana, Pa., operated from Sept., 1941, to November, 1949—a total of over eight years and two months—without a fatal accident, according to a report recently issued. In the same period, there were only 11 lost-time accidents, with a total of 720 days lost. With total exposure of 481,000 man-hours, the injury frequency rate was 22.85. In the 98 months of operation, the 31 men employed worked 2,017 days and mined 326,000 tons.

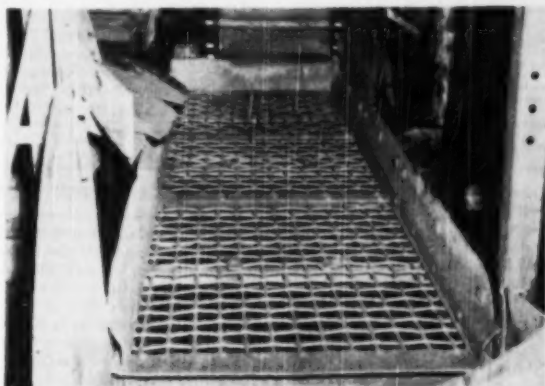
See Smokeless Fuel Made From Illinois Coal

Smokeless fuel may be made in the future from Illinois coals, Dr. M. M. Leighton, chief, Survey Division, Illinois Geological Survey, announced Dec. 28. The discovery grew out of experiments conducted in the past year in metallurgical-coke blends prepared from Illinois coals.

Reviewing the progress of research begun in 1943 in the blending of Illinois coals with Pocahontas coal in the manufacture of metallurgical coke, Dr. Leighton reported that a new market for more than 1,000,000 tons per year of Illinois coal has been found. Another project now under way looks toward the possibility of commercial preparation of a char from Illinois coal. The char would substitute wholly or partially for Pocahontas coal in metallurgical coke blends.

The survey also is aiding stoker manufacturers in their effort to build a standard stoker boiler for testing stoker coals and is making a systematic study of Illinois coal resources, including seam thickness, depth and quality as well as mining conditions, as an aid to coal operators in finding new acreages to replace worked-out mines.

Performance Proven SECO VIBRATING SCREENS For clean, properly-sized coal



This Seco double-deck screen has been giving trouble-free service in the tipple of Abbie E. Landsberry & Son, near Woodland, Pennsylvania, for over eight years. Mr. Landsberry states, "We have had various types of coal screens, but never have had a screen that gave us the service, without trouble, that our Seco has given us."



"I've seen them all—Seco's the best for accurate sizing and smooth operation." John B. Gordon, Gordon Coal Company, East Bernstadt, Kentucky. This single-deck Seco vibrating screen takes about 95 tons per hour. Large lumps that have to be scalped off do not cause any undue stress or strain because a Seco screen is built to take it. The feed end cannot bog down because of the Equalizer Assembly which rigidly connects the live screen body to the base frame."

Let Seco screening experts help you improve coal screening results. Write Dept. CA-2 for Coal Bulletin 11.

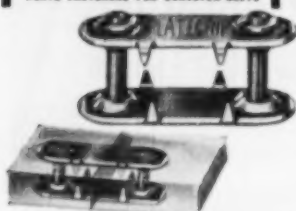


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Bureau's Colorado Unit Transferred to Denver

The Sub-bituminous and Rocky Mountain Coals Section, U. S. Bureau of Mines, formerly located at Golden, Colo., has been moved to the Denver Federal Center, Denver. Approximately 20,000 sq ft of space in Building 2A of the Federal Center has been allocated to coal investigations, with greatly improved facilities for research and service on western coals, according to J. H. East Jr., regional director. General cooperation with the Colorado School of Mines will continue in the new quarters. V. F. Parry remains in charge of the unit, with responsibility for investigations on utilization and processing of western coals.

New Developments

- The Elk Coal Co., Fairmont, W. Va., has purchased and re-opened the Cassity No. 5 mine, Cassity, W. Va., formerly operated by the Three Forks Coal Co., Ellamore, W. Va. The name of the operation has been changed to the Harry Kaufman strip mine and it will have a daily capacity of 2,500 tons, mining the Kittanning seam.

- Purchase by the Tasa Coal Co., Zelenople, Pa., of the Hitchman mine of the Hitchman Coal & Coke Co., at

Benwood, W. Va., recently was reported.

- H. H. Swaney, Inc., Clarksburg, W. Va., has acquired the Oral Lake mine, Bridgeport, Harrison County, W. Va. The name of the operation, which was formerly operated by this Rainbow Coal Co., has been changed to the Erie No. 2 mine.

- The Whiteley mine, Greensboro, Pa., has been sold by Ford & Gaskill to the McCartney Mining Co.

- R.P.M., Inc., R.D. 2, DuQuoin, Ill., has opened the Jolianna strip mine near DuQuoin. The operation is mining the No. 6 seam and has a capacity of 1,500 tons daily, shipping via the Illinois Central R.R. Preparation equipment includes a Heavy Media cleaning plant. Dennis K. Pickens, R. J. Roberts and Brantz Mayor are partners in the organization. L. W. Travelstead is superintendent and R. P. Patrick is preparation manager.

- The West Elkhorn Coal Co., Columbus, Ohio, now is operating the Porter mines, Salisbury, Floyd County, Ky., formerly operated by the Porter Elkhorn Coal Co. West Elkhorn officers include: J. S. McVey, president, R. T. West, vice president and general manager, and J. E. Jones, secretary-treasurer.

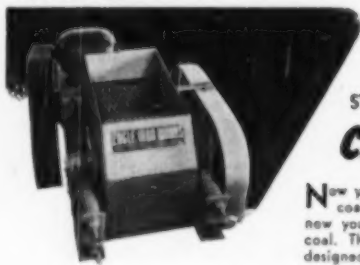
- The Martin Coal Co., Fairmont, W. Va., is now operating the Halfway mine, Simpson, W. Va., formerly operated by the J. & R. Construction Co.

- The Shay mine of the Shay Coal Co., Kingwood, W. Va., is now being operated by the McCabe Coal Co., Kingwood. The property is now known as the Bell No. 1 mine and shipments are made via the W. Va. N. and B. & O. railroads.

- Incorporation of the Amherst Barge Co., Charleston, W. Va., with the Amherst Coal Co. and the Logan County Coal Corp. as joint owners, was reported late in December. The company was started with an initial capitalization of \$2,000,000 to implement the previously announced plans of the Amherst Coal Co. for river shipment of coal from its Logan County properties (*Coal Age*, January, p. 124). The new company has purchased Ohio-River-front property 400 ft wide and about a 1/2 mi long in Huntington, according to William F. Miller, secretary-treasurer of the new company of the Amherst Coal Co. Herbert E. Jones Sr. who is president of the new barge company, is president of the Amherst Coal Co., the Logan County Coal Corp. and the Amherst Fuel Co. Charles T. Jones, vice president of the Amherst Fuel Co., is vice president of the barge firm.

- The Glo No. 1 mine of the Glogora Coal Co., Glo, Floyd County, Ky., reportedly was closed last month because "uncertain working conditions" resulting from reduced working time made it impossible to continue profitable operation. According to the report, the company was returning its

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Now you can produce 20 to 50 tons of stoker coal per hour right at your mine . . . now you can handle up to 10" maximum size coal. This Eagle "Cracker" is a brand new unit designed to meet your demand for greater tonnage and lump capacity.

The model shown has an integrally mounted motor with V-belt tension adjustment. Also available without motor and drive. Wheel mounted for portability available. Two gearings permit two reduction ranges: 3/4" to 1 1/2" through roll-spacing adjustment in one range; 1 3/4" to 2 3/4" in the other range. Requires only 10 to 15 H. P. Semi-steel crusher rolls with chilled teeth protected by automatic spring release for passing damaging scrap, etc. Large easy-loading steel hopper, welded steel base, rugged self-aligning bearings, safety steel gear guard. Write for details.

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Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

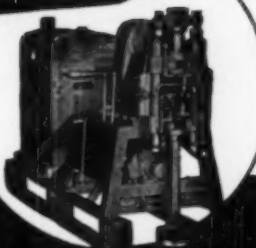
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lease on some 3,000 acres of coal land and 120 miners' homes to the Beaver Creek Consolidated Coal Co.

• The new Fies mine of the Miners Coal Co., near Madisonville, Ky., was expected to begin actual production early last month, with operation of the preparation plant scheduled for March 1. Reportedly highly mechanized, the mine is expected to produce several thousand tons daily.

• Newly incorporated mining firms recently reported but not confirmed, with their authorized capital and incorporators, include:

Pound Mill Coal Co., Hazard, Ky.; \$40,000; J. A. Smith, Edward H. Degan and Lewis Higgins; developing property in the Hazard field, initial capacity, 500 tpd.

Meadows Coal Co., Beckley, W. Va.; \$75,000; E. W., Helen and Lewis Meadows.

Badger Coal Co., Phillippi, W. Va.; \$50,000; Raymond E. Bogert Jr., Pauline Bogert and Fay Cochran.

Houchin & Hayes Coal Co., Inc., Beckley, W. Va.; \$50,000; R. H. and Mae Hayes and A. Ross Houchins.

Bem Coal Co., Braeholm, W. Va.; \$50,000; D. E. Hensley, O. W. Matthews and Joe Rukse.

Bailey Red Ash Coal Co., Iaeger, W. Va.; \$15,000; H. L. and T. M. Bailey and R. Bruce Cook.

E. & G. Coal Co., Inc., Pikeville, Ky.; \$20,000; T. C. and Addie Guthrie and Edward Epling; for development of three truck mines in Pike County.

Association Activities

Winding Gulf Operators Association Dec. 9 elected the following officers: president, S. A. Caperton, president, Gaston Coal Co., Slab Fork, W. Va.; vice president, J. W. Ailstock, vice president, Lillybrook Coal Co., Beckley, W. Va.; treasurer, P. C. Gagny, president, Gulf Mining Co., Mt. Hope, W. Va.; and secretary, Hal M. Scott.

Georges Creek and Upper Potomac Coal Association, has elected Mrs. Macy K. Dayton, secretary-treasurer, succeeding H. R. Freeman, who recently resigned.

Obituaries

Patrick Henry Burnell, operator of the Burnell Coal Co., Gebo, Wyo., died suddenly Dec. 15 at the age of 67. Mr. Burnell was aboard a train en route to Thermopolis, Wyo., when he was stricken with a heart attack.

Dr. George Rice, 83, for 27 yr chief engineer, U. S. Bureau of Mines, died Jan. 4 at the Washington Sanitarium, Takoma Park, Md., after a long illness. Dr. Rice's home was at Alexandria, Va. Since his retirement in 1937, he had been a consulting engineer. Dr. Rice was best known for his work

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Fine FOR FREEZING
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Good FOR CLOGGING
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Excellent FOR GOOD COAL
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But- if you still don't like WET COAL inquire about the C-M-I Centrifugal DRYER

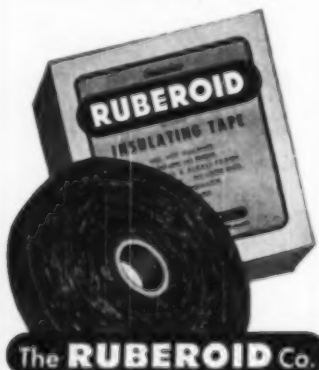
A letter stating your "wet coal" problem, will be given careful consideration. Perhaps we can show you how a C-M-I Dryer can solve your difficulties. No obligation. Simply write—

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Cables wrapped with RUBEROID INSULATING TAPE stay wrapped! And no wonder . . . it exceeds A.S.T.M. specifications by 300% in adhesiveness . . . by 26% in tensile strength . . . by 290% in dielectric strength! So extra thick, you need only one layer to insulate! Switch to RUBEROID INSULATING TAPE . . . start cutting cable maintenance costs today!



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in prevention of coal-dust explosions and for his studies in other kinds of accidents in coal and metal mines. He had been associated with several coal companies throughout the country before he became a mining engineer with the Geological Survey in 1908.

Franz N. Rupprecht, 59, special engineer, Glen Alden Coal Co., died suddenly at his home in Wilkes-Barre, Pa., Dec. 29. Mr. Rupprecht came to the United States from Germany in 1908. For the last 20 yr he had been with Glen Alden and for the last 15 had taught engineering at the Pennsylvania State Extension Night School in Wilkes-Barre.

Peter J. Minichello, 52, president, Morgan Coal Co. and Old Forge Coal Co., died Dec. 26 at his home in Pittston, Pa., following a heart attack. Besides directing his two coal companies, Mr. Minichello was vice president, Independent Coal Operators' Association, and a member of the Anthracite Allocation Council.

William J. Hinz, 68, superintendent, Brilliant Coal Co., Brilliant, Ala., for 30 yr, died at his home Dec. 28 after a long illness.

Thomas J. Newton, 56, executive of the Dark Water Coal Co., St. Clair, Pa., and retired president, Jones Coal Co., died of a heart attack Dec. 19 at his home in Pottsville, Pa. Mr. Newton also had been general manager, Rose Coal Co., Pittston, Pa., and had served on the Anthracite Allocation Committee.

John W. Patterson, 44, mine foreman, Stearns Station operation, Susquehanna Collieries Div., Nanticoke, Pa., was killed instantly Dec. 21 when a mine-car drawhead struck him, fracturing his skull. Mr. Patterson had lived in Nanticoke for 30 yr.

John V. R. Skinner, president, Coal River Mining Co., St. Albans, W. Va., died Dec. 18 after a week's illness. He was 86 yr old. In 1902, with associates from Ohio, Mr. Skinner began construction of the Coal River R. R., which later was sold to the C. & O. Ry.

James E. Ash, for the past 9 yr secretary-treasurer, Coal Producers' Association of Washington, died Dec. 17 at Seattle, Wash. His age was 57. Mr. Ash was a mining engineer for coal companies at Roslyn before becoming resident engineer and superintendent of properties for the Pacific Coast Coal Co., Black Diamond, Wash., a position he held for 23 yr.

Ralph Dudley, 57, vice president, West Kentucky Coal Co., died suddenly Dec. 22 in the Hopkins County hospital, Madisonville, Ky. His death followed a heart attack. His home was at Earlinton, Ky.

Walter Lanxon, 71, former coal operator and mine inspector, died of heart disease Jan. 8 at St. Elizabeth's Hospital, Belleville, Ill.

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GUYAN FOOTWARMERS

Here, a small investment will pay big dividends. A comfortable worker stays on the job and works more efficiently!

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NOW! NON-COLLAPSIBLE MineVent FLEXIBLE TUBING!



Now MineVent Non-Collapsible Tubing has been made available to meet the trend towards having foul air pulled out, as well as the long established practice of pumping fresh air into mines. MineVent Non-Collapsible Tubing is made from a fabric which is coated with a tough rubber-like compound, both inside and out—it's completely air-tight and abrasion and moisture resistant.

Simple interlocking sections provide for instant assembly of any length desired. Six to one lengthwise collapsibility permits packing fifteen feet lengths into a space 30" long. Comes in sizes 5" to 24" in diameter.

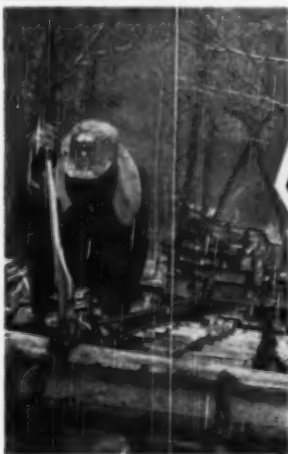
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One man with a Safety-Pull Ratchet Lever Hoist does the lifting, pulling, holding work of many—in mine, tippie or shop. Even the smallest Safety-Pull, weighing only 14 lb., delivers a 1500-lb. vertical or horizontal pull.

—is ready to go to work wherever hooked. Skidding heavy machinery, lifting batteries to shuttle cars, straightening shafts—these are but a few of the jobs it handles easily, safely.

All Safety-Pulls are tested at 100 percent overload. Dual ratchet and pawl construction cannot slip—holds securely in any position. Choice of nine sizes with capacities up to 30,000 lb. Send for Bulletin G2SP.



Quick-Lift Electric Hoists •
Hoist-Als • Mighty-Midget
Pullers • Spur-Geared Hoists
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COFFING HOIST COMPANY

Danville, Illinois

Committee Plans Bluefield Coal Show

The biennial Bluefield Coal Show, to be held Aug. 16-19, will run four days instead of three and more manufacturers will have exhibit booths than in 1948, according to an announcement by the executive committee, Southern Appalachian Industrial Exhibit. The committee met Jan. 6 at Bluefield, W. Va., to lay plans for the show. Site of the show will be the Norfolk & Western Ry. freight terminal in Bluefield. At the 1948 show, 191 nationally known manufacturers set up booths.

Foreign Developments



London—With fewer miners at work, the British coal industry mined and exported more coal in 1949 than in 1948. Deep-mined production is estimated at 202,500,000 long tons, about 500,000 tons above the target set by the government for the year. With strip-mined tonnage yet to be estimated, the total figure is certain to go above 215,000,000 tons. Exports totaled more than 19,000,000 long tons, an increase of 2,000,000 tons above the goal. The labor force declined by 16,000 in 1949. Total output in 1948 was 108,418,300 tons.

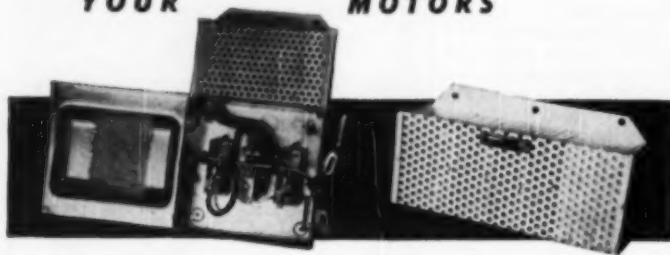
Experiments are about to begin on underground coal gasification in Newton Spinney, near Chesterfield. First efforts will be made on a lowgrade seam, the mining of which has been uneconomical. The tests will cost about \$7,500 per month.

Montreal—Spurred by the Canadian National Ry.'s announcement that it would curtail passenger service 25% effective Jan. 9 because of Coal shortage, J. P. Messervy, deputy mines minister of Nova Scotia, declared that Nova Scotia mines can supply additional coal if the railroads will order it. The railroad's curtailment order followed a gradual drop-off in stockpiles from four-months' supply in August to only 30 days' supply as of Dec. 30. As far as possible, railroad officials said, coal mined in eastern and western Canada is used in those regions but requirements in central Canada are filled almost entirely by United States miners.

The tariff of 50¢ per ton on coal brought from the United States into Canada for coking was removed Dec. 20. The removal order will be effective until Aug. 31, 1950. The tariff change also removes a 35¢ duty on

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**D. C. STARTERS
MEANS LONGER TROUBLE-FREE
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GUYAN TYPE MMS MOTOR STARTER
Manually operated—automatically makes armature-to-line connection at proper speed to insure smooth starts after power disruptions. Solderless lug connections.

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Limits initial larush of current—permits smooth starts—prevents arcing. Requires no operator. Similar to type MMS except for omission of manually operated starting switch.

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• **COMMERCIAL LINER PLATE** offers distinct advantages on mine entry operations. Entries are of uniform cross section—require no bracing—support surrounding soil at all stages of the work—water inflow is easily controlled—fast, safe construction is assured—experienced help not necessary—and plates can be moved and re-used. Commercial liner plate is available to meet all sizes of entries under all kinds of operating conditions.

THE **Commercial**

SHEARING & STAMPING CO.

Call a **COMMERCIAL** Engineer for help in driving new entries at lower costs and safe construction.

Youngstown 1,
Ohio

British coal for coking. The general tariff of 75c on coking coal from other nations remains in effect.

Vancouver—Fire of undetermined origin Dec. 23 destroyed the No. 5 briquetting plant of the Brazeau Collieries, Nordegg, Alta. Loss was estimated at over \$150,000, including a 700-ton bin without which three plant units cannot operate.

Ottawa—The Canadian government has voted \$90,000 for development of coal in the Yukon territory of northern Canada to make coal available to the settlers in that area.

Brussels—The Belgian government will aid some mine operators who will be hard hit by the newly-announced reduction in subsidies. The ruling will allow supplementary subsidies for the next five years to mines producing "greasy" coal. Total cost will be about \$500,000,000. The government also has announced that it will set aside \$700,000,000 in Marshall-Plan aid for loans for re-equipping and operating coal mines. Two producing areas, Hornu and Wasmes, recently were closed down except for one level when the government inaugurated an efficiency program.

Amsterdam—An increase of 17% in coal prices is expected from recent government action withdrawing coal subsidies.

Madrid—New mines were opened at Hulleras de Turon and new coal washers were built at Coto de Musel in 1948, according to an official government report issued Dec. 19, 1949. Also, according to the report, research and prospecting on bituminous deposits were started near Badajoz and at Jaen. Prospecting in the Ciudad Deal area has been dropped because of drainage troubles.

Melbourne—Two bills passed by the House of Representatives before the general election provide for financing long-service leave benefits for coal miners by means of an excise tax of 5.6c per ton of coal mined by workers entitled to the payments. Most miners are entitled to three months' leave on full pay after each 10 yr of service. This vacation is added to the annual three-weeks holiday with pay, which has been the rule in Australian mines for some years. The proceeds from the tax will be pooled in a government trust fund.

The first of three large walking draglines bought in the United States by the Joint Coal Board for strip mines in New South Wales recently arrived in Sidney. The machine weighs 530 tons and has a 12-yd bucket. At a 5-to-1 overburden ratio, the machine will uncover 700,000 tons of coal per year.

The New South Wales government has handed over the Oaklands coal field, with reserves of some 300,000,000 tons of steam coal, to its coal-starved sister state, Victoria, for development.

Victoria needs the coal for its railroads.

In its first decision since the Conservative government took over following the recent elections, the Coal Industry Tribunal has rejected coal miners' claims for a 35-hour week. One reason for the decision was the fear that a shorter working day would reduce output still further. Black-coal production in New South Wales in 1949 dropped to 10,640,000 tons, over 1,000,000 tons less than in 1948. The new government is pledged to develop strip mining as quickly as possible. High priority will be given to imports of mining machinery and mine owners unable to meet the costs will be subsidized. In this connection, five Joy continuous miners are due for delivery in March, the first to arrive in Australia. Two will be assigned to the Joint Coal Board, one to Port Kerbla mine, one to Amalgamated Collieries and one to the Cornwall Coal Co., Tasmania.

Wellington—New Zealand's new conservative cabinet, which recently came to power after 14 years of Labor government, will not denationalize the coal industry in the near future, if at all. Nationalization has been proceeding since April 1, 1949, with compensation assessed on the income derived from coal between 1941 and 1947.

Coal production in New Zealand



THE MERRICK FEEDOWEIGHT

Reg. U. S. Pat. Off.

tells rate per hour
—weight per day

A self-contained automatic conveyor scale, combined with automatic gate to give feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Feed rate may be varied. Large feed opening insures even flow. Uniformly feeds bulk material BY WEIGHT; and automatically totalizes weight of materials fed. Durable. Simple to operate. Rugged, heavy duty design. Slow moving parts means long life. Easy to install and maintain.

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The Merrick WEIGHTOMETER, which weighs any material carried on a belt conveyor without interrupting conveying operation. Complete descriptive matter on request.

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Engineers and Mfrs. of Automatic
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continues at the rate of 2,750,000 tons per year. Mechanization still is in the experimental stage and is somewhat limited by failure to allow for machines in original developments. However, plans for new state mines make provision for more machines.

Johannesburg—Mine workers and officials in South African Coal mines have been granted a 15% increase in basic rates, plus other improvements. Benefit Society allowances are consolidated into an amount of 1s 10d per shift and added to the basic rates. A pension fund for all daily paid workers will be established, with employers and workers contributing 5% of earnings. Present vacation allowances are increased by over 50%, an extra day's leave per year is granted, double time is paid for Sunday work and a service increment is granted employees with 10 yr service in the mines. Similar benefits and improvements are granted to mine officials.

The Southern Rhodesian government is taking over part of a high-grade coal concession from the Wankie Colliery for £350,000. The government will offer this coal to any approved company undertaking production of oil from coal. The government's purchase represents about 82% of total deposits in the concession and is estimated at 2,340,000,000 tons. The Wankie Colliery is expected to use the proceeds from the purchase to boost its output from 2,000,000 to 3,500,000 tons annually.

Preparation Facilities

Westmoreland Coal Co., Hutchinson mine, Hutchinson, Pa.—Contract closed with Fairmont Machinery Co. for addition to present plant; capacity, 300 tph of 3x0, with 3x1/4 cleaned in a Chance cone.

Buchanan County Coal Corp., Big Rock, Va.—Contract closed with Fairmont Machinery Co. for one American pneumatic separator to be added to present plant to handle 50 tph of 3/4x0-in coal.

Altos Hornos de Mexico, S. A., Monclova, Coahuila—Contract closed with Jeffrey Mfg. Co. for two-compartment diaphragm jig; capacity, 50 tph, 6x0-in coal.

Coal Publications

HD-5 Tractor Service Manual. 220 pp. \$3. Allis-Chalmers Mfg. Co., Tractor Service Department, Box 512, Milwaukee 1, Wis. Twenty-three sections on operation, maintenance and repair of the HD-5 tractor, with attention to description, specifications,



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assemblies, adjustments, special tools, fits and tolerances.

Proceedings of a Coal Briquetting Conference. Natural Resources Research Institute, University of Wyoming, Laramie, Wyo., Information Circular No. 3. 118 pp. 8½x11-in; paper; mimeo. \$1. Thirteen papers, with discussions, presented at a conference June 24-25, 1949, covering such subjects as plant operation, machinery, briquet quality, binding materials, drying, preheating and briquetting economics.

Social Insurance, Pensions and Other Fringe Benefits. 4 pp. 8½x11-in; paper. 10c, Business Information Bureau, Cleveland Public Library, Cleveland 14, Ohio. A supplement to a similar bulletin issued in March, 1949, listing books and articles on social security, welfare plans, profit sharing and collective bargaining.

Guide for Making Cost Estimates for Chemical-Type Operations, by C. W. Van Noy, T. C. Dunville, R. G. Dressler and C. C. Chaffee. U. S. Bureau of Mines, R.I. 4534. 8x10½-in;

paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. Cost factors and operating-cost estimates for plants making synthetic-liquid fuels, anhydrous ammonia and other products, exclusive of capital-investment costs.

Average Heating Values of American Coals by Rank and by States, by G. J. Flynn Jr. U. S. Bureau of Mines, I.C. 7538. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. Tentative averaged data, with tables and bibliography of detailed analyses in Bureau Technical Papers.

ASTM Standards on Coal and Coke, With Related Information, by ASTM Committee D-5, Oct., 1949. 164 pp. 6x9-in; paper. \$2, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Twenty-eight test methods, specifications and definitions, together with numerous proposed methods, for testing and sampling.

Proceedings of the Smoke Prevention Association of America, 1949, 189 pp. 8½x11-in; paper. \$2, John Paul Taylor, publisher, 520 Pleasant St., St. Joseph, Mich. Twenty-three articles on industrial-smoke and health problems, city air-purification programs and, smoke-abatement devices.

Publications of the Bureau of Mines on Coal Washing, by W. J. Crenzt. U. S. Bureau of Mines, I. C. 7531. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. A list of 60 technical reports on coal cleaning released by the Bureau in the past 39 yr. Priced publications, free publications and publications no longer available are listed separately.

Observations of Safety Practices and Conditions in Japanese Coal Mines, by R. G. Warneke. U. S. Bureau of Mines, I.C. 7542. 38 pp. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. Administrative weaknesses and psychological factors are responsible for the high accident rate in Japanese coal mines.

Coal Carbonization: Effects of Blending Pocahontas No. 3 Coal With 12 High-Volatile A Coals, by D. A. Reynolds. U. S. Bureau of Mines, R.I. 4552. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. Carbonizing qualities of 12 high-volatile A coals are improved by blending with Pocahontas No. 3.

Measured Coal Reserves in Michigan by Townships and Counties, by G. V. Cohee. U. S. Geological Survey, Washington 25, D. C. Free. Preliminary tables showing provisional appraisals of coal reserves. Published especially for those who may have additional information that should be incorporated in the final report.

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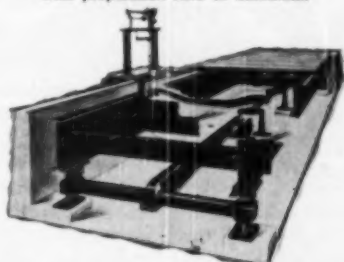
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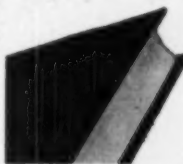
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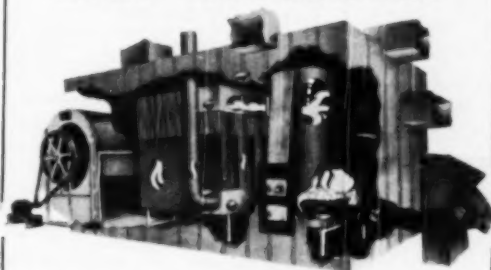
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Complete Stock A.C. Motors—New and Rebuilt Up to 500 H.P.—Sq. Cage, Slip Ring, Synch.

SPECIAL—2—300 H.P. Allis-Ch. slip ring motors, 720 RPM, 2,200 volts.

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1 1/2 to 10 Ton 15" to 56" Track Gauge.
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Greensburg, Pa.

M-G SETS — ROTARIES

2 ph. 60 cy.
200 KW West. 550 v.—110 MI 2200 v. Syn.
450 KW G. E. 275 v.—2200 v. Syn., 720 RPM.
200 KW G. E. Rotary 275 v. with 8-110 KVA 2200/4000 v. Transformers and control.
300 KW G. E. 275 v.—200 I Syn. 2500/2,000/1200 Rev.
250 KW West. HK 250 v. 2200 v. Syn. 1200 Rev.
150 KW G. E. 275 v.—225 I Syn., 2200/3,000/1200 Rev.
150 KW West. 125-225 HP Ind. 2200/440/220 v.
100 KW Rider 275 v.—150 HP Syn. 2200 v.
100 KW West. 125 v.—150 HP Ind. 2200/440/220 v.
50 KW G. E. 250 v.—10 HP Syn. 220/440 v.

A. C. MOTORS

500 I G.E. MP115 2200/2,000, 450 Rev. S.E.
350 v. HP. West. CW 2200/2,000 600 RPM S.E.
300 HP G.E. 1 M 2200/2,000 450 RPM S.E.
150 HP G.E. KT 220/440 v. 500 RPM.
100 HP G.E. Type 1 K 2200/2,000 500 RPM S.E.
150 HP G.E. Syn. 220/440/2,000 600 RPM.
150 HP West. CR 220/440/2,000 500 RPM S.E.
100 HP G.E. 1 M 440/220/2,000 450 RPM S.E.
100 HP Allis AN 440/220/2,000 600 RPM S.E.

D. C. MOTORS & GENERATORS

75 HP West. HK 150, 220 v. 1150 RPM.
50 KW West. HK 250 v. 1200 RPM Gen.
50 HP West. CR 220/440/2,000 500 RPM S.E.
30 HP West. HK 55, 220 v. 1750 RPM.
150 KW Triumph 250 v. 600 RPM Gen.
150 KW G. E. 550 v. HC 1150 RPM Gen.
125 KW West. HK 250 v. 500 RPM Gen.
100 KW West. HK 250 v. 600 RPM Gen.

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1—100 KVA All. Ch. 220 v.—220 v.
6—75 KVA G.E. 2200 v.—115/220 v.

PROMPT SHIPMENT ON ALL SIZES A. C. AND D. C. REBUILT MOTORS.

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20/25 Ton G.E. 500 V. 42"/44" ga. SHM804
S.B. Motors.

13 ton Jeff. 250 v. 44" Ga. MH11D.
18 ton Jeff. 250 v. 40"/42" Ga. MH 110 Motors.
8 ton Goodman 500 v. 42"/44" Ga. #104CH.
8 ton Goodman 250 v. 42"/44" Ga. #104CH.
6 ton Jeff. 250 v. MH 88 Gash. 43" Ga.
6 ton West. 250 v. 804 Motors 56" Ga.
3 1/2 ton Goodman 500 v. 42" Ga. Gash.
2 1/2 ton Goodman, 250 v. 42" Ga. sgl. motor, gash.

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3—14 Btl. Jay 250 V. D.C. permissible.
1—8 Btl. Jay 220/2,000 A.C. permissible.
3—5 Ton Jay Shuttle cars with batteries.

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6 ton G.E. Permissible RH Motors, 50/44" Ga.
D/5 ton Irons Type A 30/45 Ga.

MINING MACHINES

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1—112H Goodman 550 V. permissible.
1—113 Goodman 50 v. A.C. 220/2,000 perm.
1—1053 Goodman 220/3,000 open.

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300 HP Ligerwood sgl. fixed drum, 8 1/2" dia. 5' face. 5" Hedges ground—14" cable, 500 HP
2200/4400/1,000 Westing. C.W.

75 HP Med. Norton sgl. fr. drum—AC Motor.
1—50/75 HP 2 drum Made Norton sng.
50 HP Herf & Patterson sgl. fixed drum, 4' dia.



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GENERATORS
TRANSFORMERS
1 to 1500 H.P.

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COAL MINE EQUIPMENT
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- 5—Goodman 312-AA Low Volt.
- 6—Jeffrey 10-B Low Volt.
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- 5—Jeffrey 7-AU Permissible Type Universal.
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- 5—Jeffrey 10-BB practically new.
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- 9—Jeffrey 34-L Late Type Loggall.

LATE TYPE CUTTING MACHINES 220/440 VOLT AC

- 16—Goodman 12-GL on tip-turn trucks.
- 7—Goodman 112-GSA.
- 6—Jeffrey 7-B on tip-turn trucks T-8.
- 5—Goodman 512-CL3 on tip-turn trucks.

LOCOMOTIVES, 250 VOLT DC BALL BEARING MOTORS

- 1—New 20-ton Jeffrey Tandem.
 - 2—15-ton Goodman, Type 36-A04C.
 - 3—15-ton General Electric, Type HMR20.
 - 3—15-ton Jeffrey, Type MW110.
 - 3—15-ton Westinghouse, Type 500C.
 - 3—10-ton Goodman, Type 34-B.
 - 3—10-ton Westinghouse, Type 502C.
 - 3—10-ton General Electric, Type HMR10.
 - 4—10-ton Westinghouse, Type 505C.
 - 4—10-ton Goodman, Type 32A17.
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- The above Locomotives have been completely rebuilt. We have four General Electric HMR21, 250 volt DC, 40" gauge, Gathering Locomotives with CY-21 reels and cable, completely rebuilt and guaranteed, which we are offering at \$4,250.00 each, subject to immediate inspection and prior sale.

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- 1—Joy LaDel 90" Belt Conveyor, 5,800' centers.
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- Both Belts are practically new, complete with drives, head and tail sections, idlers and all necessary appurtenances.
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- 6—Jeffrey L-400.
- 6—Joy 8-BU.
- 2—Jeffrey L-500.
- 11—Joy 7-BU.
- 3—Jeffrey L-800.
- 6—Joy 11-BU.
- 3—Goodman 480.
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- 10—7-ton General Electric, Type 600-B, with good Exide Batteries.

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- 100 KW, 200 KW, and 300 KW Late Type Motor Generator Sets and Rotary Converters, equipped with switchboards and all necessary switchgear.

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- 3—112 A.A. Goodman Universal D.C.
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- 3—112 G.J. Goodman Universal 220 Volts A.C.
- 4—80 H.P. Goodman Standards 220 V. A.C.
- 4—358 Jeffries Machines 250 Volts D.C.
- 1—358 Jeffries Machines 220 Volts A.C.
- 4—C67 Sullivan Machines A.C. and D.C.
- 2—78 Sullivan Machines 280 Volts D.C.

LOCOMOTIVES

- 6—4 Ton G.E. Ball Bearing 47 inch Gauge
- 1—5 Ton Maucha Storage Battery Motor 42 inch Gauge
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- 1—300 K.W. M.G. Set 1200 R.P.M. Complete with Switchboard, both are G.E.
- 4—BU Jays 34 and 42 inch Gauge on Cabs.
- 4—A.C. and D.C.
- 6—BU Jays 47 inch Gauge on Cabs A.C. and D.C.
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Belt, Bucket, Drag or Gravity
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- 225 HP Busch Sulzer 159 KW diesel engine generator set.
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Rotary Converter

- 1—150 Kw General Electric Synchronous, Type HCC-6, compound wd., 275 Volts DC, 1200 rpm., 6 phase, 60 cycle, pedestal type. Thoroughly overhauled and guaranteed. COMPLETE with transformers and Swbds.

Larger converters also stocked

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General Electric, Type CDM 83, 20 H.P., 1450 to 1800 RPM, with GSR Speed Regulator. Ball bearing, stabilized shunt, 230 volt, 40°C., shockproof, splashproof construction.

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- One G.E. 4-ton Locomotive, 27" above rail.
- Two G.E. 10-ton Locomotives, 29" above rail.
- Two 200 KW G.E. Rotary Converters.
- One Ea. 24" & 30" Belt Conveyors.
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- Ingersoll Hand Air Compressors — Trach Mounted.

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- Bronze and Cast Mine Pumps—Mine Fans.
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- Boom-hoists—Loading Booms.
- Complete Machinery for Tipples, 1 & 2 Track.
- New Link Belt Vibrators, 4'x12' and 7'x10'.
- Drop Bottom Mine Cars, 18" Gauge.
- 20 New—60 Used End Dump Mine Cars, 48" 12a Low Vein.
- 200 Tons Ea. 492 and 502 Rail—Other Sizes Also.
- 42" and 48" 12a Steel Mine Ties, 252 and 192.
- Stationary Motors. All Sizes AC and DC.
- One Wilson 300 Amp. Electric Welder, 220-440 Volt.

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- 1000 KW General Electric, type MCP-8, 250 volt DC, 360 rpm, driven by 1400 HP, General Electric Synchronous motor.
- 100 KW General Electric, type MPC, 125/250 volt DC, driven by 450 HP, General Electric Synchronous motor, 1200 rpm.
- 2—200 KW General Electric, type DMC, 250 volt DC, generator driven by 450 HP, General Electric, type PT motor, 720 rpm.
- 250 KW General Electric, type MPC, 125 volt DC, compound wound, driven by 370 HP, 720 rpm motor.
- 150 KW, Westinghouse, 250 volt DC, generator, driven by 225 HP, Synchronous motor, new unit.
- 100 KW, Delco, 250 volt DC, Squirrel Cage motor.
- 100 KW, Westinghouse, type SK, 125 volt DC, Squirrel Cage motor.

COMPLETE STOCK, FROM 1 KW.

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FOR SALE

CRUSHERS

- 1—20x36 United Iron Works single roll crusher.
- 1—24x40 Mc-Nally Pittsburgh double roll crusher.
- 1—36x60 Link Belt double roll crusher.
- 1—24x54 Jeffrey single roll crusher.

HOISTS

- 1—Ottumwa Iron Works central drum hoist, serial 21163, weight 25,000 lb., 1 1/2" rope, complete with remote control and hydraulic brake. Direct connected to GE 300 HP motor, model 2C2647, type TFC-5017, form M 2-106/2200V, 575 RPM, 12 1/2 amps, 270 secondary amps, complete with automatic switchboard.
- 1—Ottumwa Iron Works, single rigid cylinder-central drum hoist, serial 21000, weight 45,000 lb., 1 1/2" rope, complete with remote control and hydraulic brake, direct connected to Western Electric 110 HP motor, model 17415, type NT 244-19-150-T26, form B, 3 phase, 48 cycle, 140 volts, slip ring, secondary volts 358, amps. 187, secondary amps. 182, speed full load 780, serial 2102212, continuous 40° C. Complete with controller and resistors.
- 1—Ottumwa Hoist 21301, drum diameter 18", face 36", face grooved for 1 1/2" rope, equipped with post brake 14" diameter, hand operated, single reduction and spur gears, 18 teeth and 190 teeth, 1 1/2" pitch, 10" face, drum shaft 7" diameter, drum shaft bearing 7x1 1/2", pinion shaft bearing 4 1/2"x1 1/2" of the ring oiling type.

LOCOMOTIVES

- 1—12 ton Goodman ball bearing locomotive, 42" gauge, type 30R 0-4 T.
- 4—8 ton Goodman ball-bearing locomotives, 36" gauge, type 32-A04T.
- 1—8 ton Goodman ball bearing locomotive, 42" gauge, type 32-A0 4T.
- 1—8 ton Westinghouse locomotive, 36" gauge, Class 1-2 32-C 427.
- 1—4 ton Jeffrey locomotive, 42" gauge.
- 6—4 ton GE ball bearing locomotives, 42" gauge, class EM276M11 with HMS21-A motors.
- 1—4 ton Whitcomb Battery locomotive, 36" gauge.
- 2—4 ton Goodman ball bearing locomotives, 36" gauge, type 12-1-T, with or without gathering rails.

MINING MACHINES

- 1—312AA Goodman DC Universal mining machine, 30" gauge, 6 1/2 ft. cutter bar.
- 4—CLEC, AC, 3 phase, 48 cycle, 220 volt, Sullivan longwall mining machines.
- 1—Jeffrey Shearwall Mining Machine, 35 BB, AC, 6" cutter bar complete with slip turn truck, cable and reel.
- 1—Sullivan Shearing Machine, Class CH11, DC, 9" cutter bar.
- 2—Sullivan Longwall Mining Machines, type CR8, 3-68/220 volts, 30" cutter bars.
- 1—Sullivan shearing machine, class CH 11 AC.
- 1—12AA Goodman mining machine, 30 HP, 42" gauge.
- 2—Goodman Standard mining machines, 30 HP, 3/68/220 volts, 42" gauge.

MOTOR GENERATOR SETS

- 1—90 KW GE motor generator set type CD 123, form A, comp. wound, 227 amps, 258 volts no load, 275 volts full load, 1200 RPM, cond. 58 deg. cent., 2150000 direct connected to 125 HP GE syn. motor type TM form PK, frame 1554, 3-68/2200 volts, 1200 RPM, 27.8 amps, cond. 48 deg. cent. Excitation 250 volts, 8.8 amps, .76 PF, 21514971, complete with switchboard.
- 1—200 KW Ridgway syn. motor generator set, 2300 volts AC, 1200 RPM, 250-275 volts DC, complete with switchboard, one has brand new GE automatic circuit breaker.

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- Truckload and car lots of good second hand 16, 20 and 25 lbs. rails.
- Carload lots of 12 lb., 14 lb., 20 lb., 25 lb. and 36 lb. rails. Price and delivery information upon request.

ROTARY CONVERTERS

- 1—200 KW Westinghouse Rotary Converter complete with transformer and switchboard.

ELECTRIC DRILLS

- 2—Dunlop AC Electric coal drills, steel 472 phase, 60 cycle, 220 volts.
- 2—Dunlop Electric coal drills DC.

COPPER

- Several hundred feet used 300,000 CM Weatherproof stranded copper.
- Several hundred feet used 300,000 CM Bare stranded copper.
- Several thousand feet used 6/6 Figure 6 trolley wire.
- Several thousand feet 1,000,000 CM lead covered copper.
- 1,800 feet 2/3 Conductor rubber covered cable—used.
- Several thousand feet of used 6/6 Figure 8 trolley wire.
- Several thousand feet of used 3-Conductor No. 2000 volt cable.
- Several thousand feet used 300,000 CM Cable.

TIPPLE

- 1—Steel tipple complete with shaker and concrete silos. Capacity 1,000 tons per day.

BUCKBILLS

- 12—420 Goodman Duckbills Complete, AC.
- 2—G20 Goodman duckbills, DC.

PIT CARS

- 300 All Steel Timken Roller Bearing Mine Cars, Overall height 3' 10", Overall length 7' 5", Overall width 6' 5", Wheelbase 2' 5", 42" gauge, 14" Timken Roller Bearing Wheels.
- 70 Wooden Mine Cars, also with Timken Roller Bearings. Specifications same as above.

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GAVENDA BROTHERS, Inc.

CANTON, ILLINOIS

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Jeffrey, Goodman, Sullivan, D.C. and A.C., 3 phase.

LOCOMOTIVES:

Jeffrey, Westinghouse, General Electric, Goodman, Ironton.

SUBSTATIONS:

Motor Generator Sets, Rotary Converters.

SPARE ARMATURES:

For Locomotives, Machines, Rotary Converters and others.

MOTORS:

D.C. and A.C., 3 Phase.
1—Synchronous 145 H.P., 600 RPM Western Electric type AT-12-150 440 volts, can be rewound—direct connected exciter.

TRANSFORMERS:

2 phase and single phase, also rotary.

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WELDERS,

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STARTERS, SYNCHRONOUS.

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LOGAN, WEST VIRGINIA

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- 1—750 KW G.E. Syn. 275 V. 720 RPM
- 1—500 KW G.E. Syn., 275 V. 900 RPM
- 1—400 KW WEST. Syn. 575 V. 720 RPM
- 1—300 KW G.E. Syn. 275 1200 RPM
- 1—200 KW G.E. Syn. 275 V. 1200 RPM
- 1—150 KW G.E. Syn. 275 V. 1200 RPM

GENERATOR ARMATURES

- 1—500 KW G.E. 275 V. MPC, Form L 900 RPM
- 1—500 KW G.E. 575 V. MCF, Form H 900 RPM

ROTARY CONVERTERS

- 1—500 KW WEST. Syn. 275 V. 1200 RPM
- 1—300 KW G.E. Syn. 575 V. HCC 1200 RPM

CONVERTER ARMATURE

- 1—300 KW G.E. 575 V. HCC, Form P 1200 RPM

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501 GRANT BUILDING

PITTSBURGH 19, PENNSYLVANIA

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- 2—30 T JEFFREY 250 V. MH-77 48-34" Ga.
- 1—20 T JEFFREY 250 V. MH-77 48-34" Ga.
- 3—13 T JEFFREY 250 V. MH-2110 42-32" Ga.
- 1—13 T G.E. 250 V. MH-877 44-36" Ga.
- 1—10 T JEFFREY 250 V. MH-110 44-32" Ga.
- 1—10 T WEST. 250 V. ML-907-C 44-36" Ga.
- 1—8 T WEST. 250 V. ML-904-C 44-36" Ga.

LOCOMOTIVE MOTORS

- 2—G.E. 980 V. HM-820-A, Ball Bearing
- 2—WEST. 250 V. ML-908-C, Ball Bearing
- 2—WEST. 250 V. ML-907-C, 8.8 (New)
- 2—WEST. 250 V. ML-906-C, Ball Bearing
- 2—WEST. 250 V. ML-904-R, 8.8 (New)
- 1—WEST. 250 V. ML-901-C, 8 1/2 Bearing
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Extra Armatures Available for almost all of the Above Motors.

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Converters, Motor Generator Sets, and D.C. Motors, Control Equipment and Transformers, Meters and Relays. We build equipment to fit your requirements. Over 25 years engineering background.

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- 125 HP, 1000 RPM, West SK 230 v. D.C.
- 80 HP, 1200 RPM, Cr. Wb., 220/440/3/60 Ind.
- 75 HP, 900 RPM, Elec. Mech., 220/3/60 Syn.
- 75 HP, 1000 RPM, U.S. 220/440/3/60 Ind.
- 5, 7 1/2, 10 and 15 HP, AC & DC TEFC & Open.

Send Us Your Transformer Inquiries.

SYNCHRONOUS ROTARY CONVERTERS

		6 ph. 60 cycle		Speed	DCV
Ga.	KW	Make	G. E.		
1	1000	G. E.	1200	800	
1	1000	G. E.	1200	800	
1	3000	G. E.	1200	875	
2	175	G. E.	1200	275	
1	75	G. E. (3 Ph.)	1000	275	

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Guaranteed Equipment—
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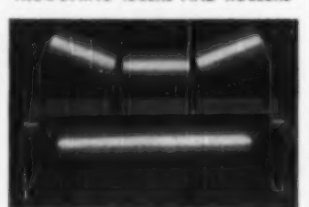
100 machines in stock screen sizes 2'x5' to 5'x14';
1 to 5 decks. Positive throw eccentric shaft types;
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Prices from \$395.00

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Troughing idler conveyors—picking tables. Any
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Prices from \$195.00

TROUGHING IDLERS AND ROLLERS



All steel. Interchangeable with other well-known
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14" belt \$18.50 24" belt \$21.00
16" belt 19.50 30" belt 22.00
18" belt 20.00 36" belt 23.00
42" belt \$24.00

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15 to 35 ton per hour capacity \$150.00
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50 to 100 ton per hour capacity 575.00
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15 Ton Truck Scales \$450.00
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phone. Hundreds of uses for quick, low-cost,
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One-Mile Reels, formerly 27.50 mile.

SALE SPECIAL \$21.00

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500 Ft. Coils, formerly 9.95.

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1,000 Ft. Coils, formerly 7.50.

SALE SPECIAL \$3.75

Grade II, unused, outer layer
wire weathered but when re-
moved inside layers perfect. Usability not impaired.

ONE MILE REELS, formerly 27.50 mile.

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1/2-MILE REELS, formerly 14.25 mile.

SALE SPECIAL \$9.00

W130 Lightweight Assault wire, 2-conductor.

TWO-MILE REELS, unused, NEW, (19,800

ft. continuous) wt. only 55 lbs. A real ex-

tra. Formerly 57.50 reel. **SALE SPECIAL**

BRAND NEW 1/2-MILE REELS, Wt. 10

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1/2-MILE REELS, slightly weathered, unused, \$4.95

Mine and Slope Hoists

1—20,000# Dbl. Drum Mundy, w/o motor
1—26,000# Nordberg Sgl. Drum
1—10,000# Nordberg Sgl. Drum AC
1—17,000# Ottumwa Sgl. Drum AC
1—11,000# Ottumwa Sgl. Drum AC
1—16,000# Allis Chalmers Sgl. Drum
1—30,000# Allis Chalmers Dbl. Drum AC
1—7,000# Allis Chalmers Dbl. Drum AC
1—7,000# Flory Sgl. Drum AC
1—10,000# Wellman AC

Crushers and Screens

1—12x16 Eagle Dbl. Roll
1—18x20 Eagle Dbl. Roll
1—3B American Pulverizer
1—30x54 McNally Pitts. Sgl. Roll
2—24x20 J&H. Flautooth
1—255 Kennedy Van Saun Gearless
1—Superior McCully 8" Gyratory
1—30x36 S.A. Ring type Knittel (never used)
2—4x10 S.A. Vibrating Screens
4—Tyler Vibrating Screens

Conveyors and Loaders

1—5000# Jeffrey Carspotter AC
1—6000# Brownie Carspotter AC
1—5000# Link Belt Carspotter AC
1—S.A. Heavy Duty Loader AC

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1—Buc. Erie 85 3/4 Elec. Shovel

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5 h.p. O.E. v. — 100/1800 r.p.m.
5 h.p. West 220 v. — 685 r.p.m.
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HP	MAKE	TYPE	SPEED
200	West.	SK-210	800
175	G. E.	MD	450
150	West.	SK	500
125	G. E.	CD	400
125	Century	drip proof	1800
100	West.	SK-190	500
100	West.	S	425
75	G. E.	CDM	1600
60 NEW	G. E.	1K—splash proof	650
40 NEW	West.	SK-123	650

D.C. Generators

250-275 Volts

KW	MAKE	TYPE	SPEED
250	West.	SK-210	1200
200	West.	SK	600
175	West.	SK-190	700
150	West.	SK	720
100	G. E.	S	750
75	West.	SK-123	600
75	Allen Chalmers		750
75	West.	SK	850
75	Allen Chalmers		850
60 NEW	G. E.	CD	1150
40 NEW	West.	SK-123	1150

MG Sets

250/275 V. D.C.

KW	MAKE	RPM	VOLTS	TYPE
200	West.	1200	250/440	Ac Ind.
200	West.	1200	250/440	Ac Syn.
150	West.	800	250/440	Ac Syn.
100	West.	800	250/440	Ac Syn.
100	West.	1200	250/440	Ac Syn.

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48"	8	1/8"	1/16"	24"	4	1/8"	1/32"
42"	5	1/8"	1/16"	20"	5	1/8"	1/32"
36"	6	1/8"	1/16"	20"	4	1/8"	1/32"
30"	6	1/8"	1/16"	18"	4	1/8"	1/32"
30"	5	1/8"	1/16"	16"	4	1/8"	1/32"
26"	5	1/8"	1/32"	14"	4	1/16"	1/32"
24"	5	1/8"	1/32"	12"	4	1/16"	1/32"

Inquire For Prices — Mention Size and Lengths

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ENDLESS "V" BELT

HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

Specify Thread On Couplings

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2"	30 "	23.00
1 1/2"	25 "	13.00
1 1/2"	50 "	20.00
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1"	50 "	10.00	1.50 Pair
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3/4"	25 feet	\$4.25	1"	35 feet	\$10.50
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1"	25 "	6.25	1"	50 "	15.00
1"	50 "	12.50	1 1/2"	25 "	10.00
1 1/4"	25 "	7.50	1 1/2"	35 "	14.00
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196

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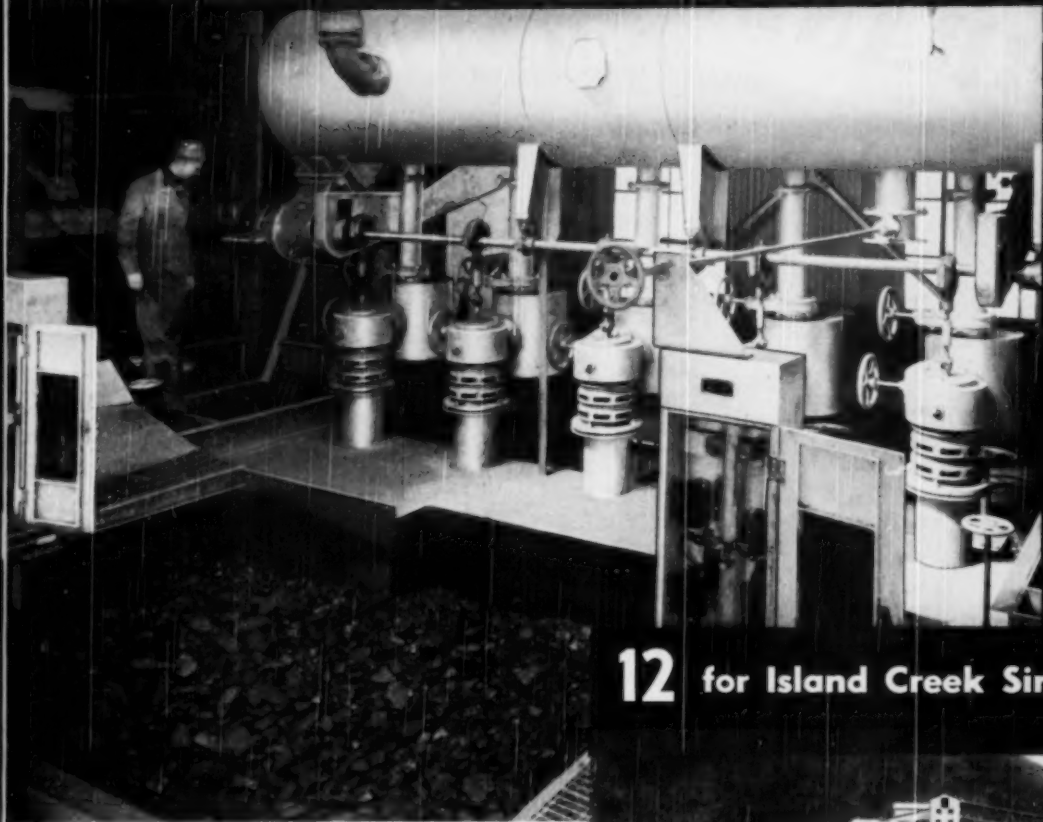
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